CRF-160

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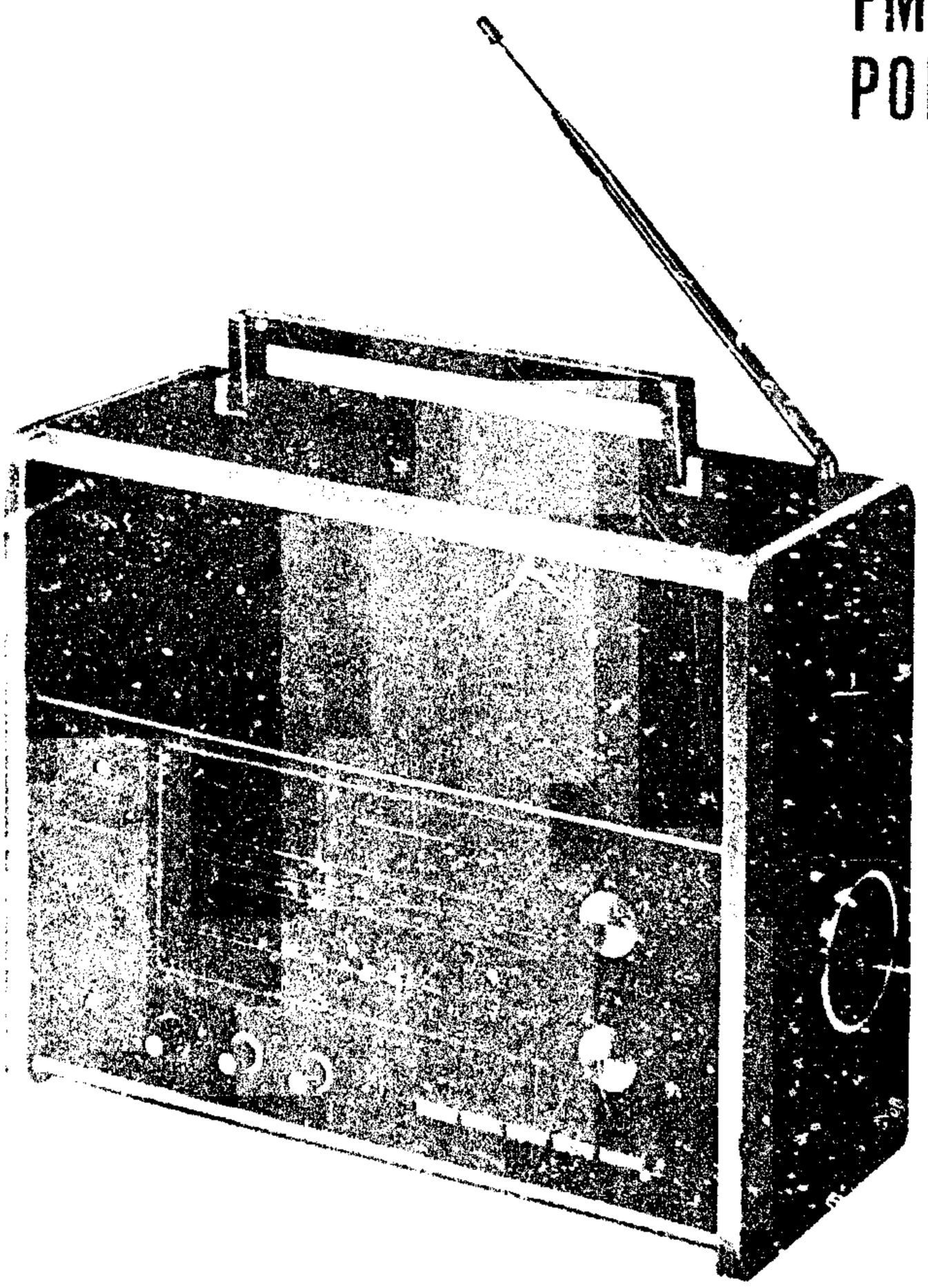
FM/AM 13-BAND PORTABLE RADIO



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SONY
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CRF-160

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SECTION 1
TECHNICAL DESCRIPTION

1-1. SPECIFICATIONS

Circuit System: 2-FET, 19-transistor, 12-diode superheterodyne

Frequency Coverage:
FM; 87.5 – 108 MHz (3.42 – 2.78 m)
MW; 530 – 1,605 kHz (566 – 187 m)
LW; 150 – 400 kHz (2,000 – 750 m)
SW1; 1.6 – 4.5 MHz (187 – 67 m)
SW2; 4.7 – 5.3 MHz (64 – 57 m)
SW3; 5.8 – 6.4 MHz (52 – 47 m)
SW4; 7.0 – 7.6 MHz (43 – 39 m)
SW5; 9.5 – 10.1 MHz (31.6 – 30 m)
SW6; 11.6 – 12.2 MHz (26 – 24.6 m)
SW7; 15.0 – 15.6 MHz (20 – 19.2 m)
SW8; 17.5 – 18.1 MHz (17 – 16.5 m)
SW9; 21.4 – 22.0 MHz (14 – 13.6 m)
SW10; 25.5 – 26.1 MHz (11.8 – 11.5 m)

Intermediate Frequency:
FM; 10.7 MHz
MW, LW, SW1; 455 kHz
SW2–SW10; 1st: 1.55 – 2.25 MHz
2nd: 455 kHz

Antenna System:
FM; telescopic antenna or external antenna (impedance 50~300 Ω)
MW, LW; built-in ferrite bar antenna or external antenna (high impedance)
SW1; telescopic antenna or external antenna (high impedance)
SW2–SW10; telescopic antenna or external antenna (impedance 75 Ω)

Maximum Sensitivity: (at 50 mW output, S/N 6 dB)
FM; 1 μV (0 dB)
MW; 25.5 μV/m (28 dB/m)
LW; 39.8 μV/m (32 dB/m)
SW1; 1 μV (0 dB)
SW2 – SW10; 1 μV (0 dB)

Selectivity: 40 dB at 1,400 kHz ± 10 kHz off resonance

Power Requirement: Six "D" size flashlight batteries 9 volts in total, or house current
(ac 100 V, 120 V, 220 V, 240 V for General Export Model
ac 120 V for USA and Canada Model)

Power Output
at 10% distortion: 2.3 W (with ac power supply), 1.1 W (with battery)
maximum: 3.8 W (with ac power supply), 1.7 W (with battery)

Current Drain
at zero signal: 78 mA (with ac power supply), 35 mA (with battery)

Speaker: 3 1/8" (8 cm) x 6 1/4" (16 cm), 4 Ω

Dimensions: 13 1/8" (W) x 10 13/16" (H) x 5 11/16" (D)
(340 mm x 275 mm x 144 mm)

Weight: 15 lb 7 oz (7 kg)

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1-2. TECHNICAL FEATURES

* High-performance portable radio receiver with thirteen bands; FM, MW, LW, SW1-SW10.
* FET (field effect transistor) with triple-tuned passive input circuit for superior interference rejection.
* High-sensitivity and selectivity on SW bands using double-superheterodyne front end.
* High-fidelity af amplifier with OTL circuit.
* Choice of three power sources; house current, battery, car battery.
* BFO circuit for SSB signal reception.

1-3. CIRCUIT DESCRIPTION

Stage/control — *Function*

Fm Front End

FET mixer Q101

Usually an fm front end consists of an rf amplifier, mixer and local oscillator as shown in Fig. 1-1.

The rf amplifier sometimes worsens the crossmodulation handling ability of the receiver when ordinary bipolar transistors are used. It is, however, difficult to eliminate the rf amplifier because its removal causes strong spurious radiation, poor sensitivity, and a poor noise figure. To solve this problem, the Model CRF-160 uses a low-noise junction FET for the mixer and a triple-tuned passive input circuit as shown in Fig. 1-2. The Model CRF-160 is capable of clear fm reception even in strong signal-strength areas due to the extremely superior interference-rejection characteristics of the passive input circuit.

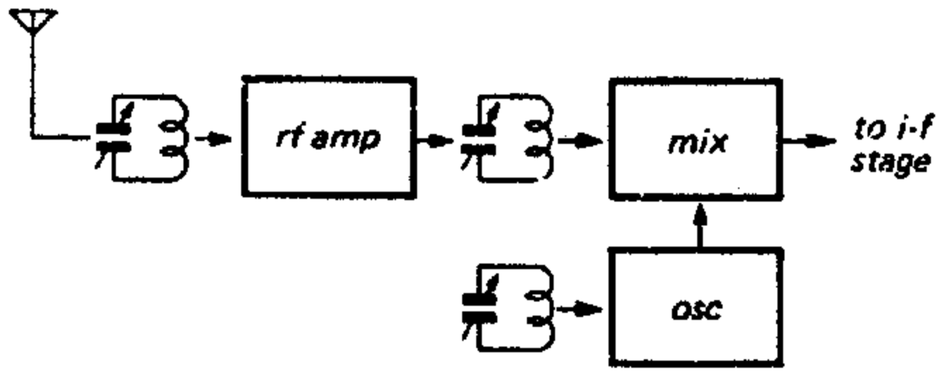

Fig. 1-1 Usual fm front end

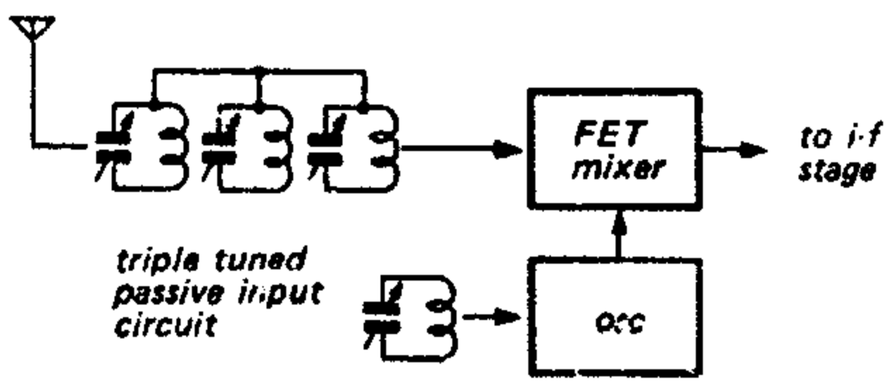

Fig. 1-2 CRF-150 fm front end

Local oscillator Q102

The oscillator generates a frequency 10.7 MHz higher than the incoming signal frequency and injects the generated voltage at the source of FET mixer Q101.

Afc diode D101

This diode is connected across the resonant circuit of the oscillator and works as a variable-capacitance diode. A dc feedback voltage from the discriminator controls the bias applied to the diode to keep the local oscillator frequency correct.

Fm i-f amplifier Q103

Transistor Q103 amplifies the 10.7 MHz i-f signal produced by mixer Q101 and coupled to it through i-f transformer IFT F101.

Sw Front End

Double-superheterodyne

A block diagram of the sw front end is shown in Fig. 1-3. Such an arrangement effectively suppresses image signals, since the high value of the first i-f causes the desired and image signals to differ greatly in frequency. At the same time, the relatively low value of the second i-f makes it possible to obtain high amplification as well as sharp discrimination against signals differing only slightly in frequency from the desired signal.

The result is that this double-superheterodyne front end provides a combination of greater image suppression and higher adjacent channel-selectivity than can be realized in a simple superheterodyne receiver.

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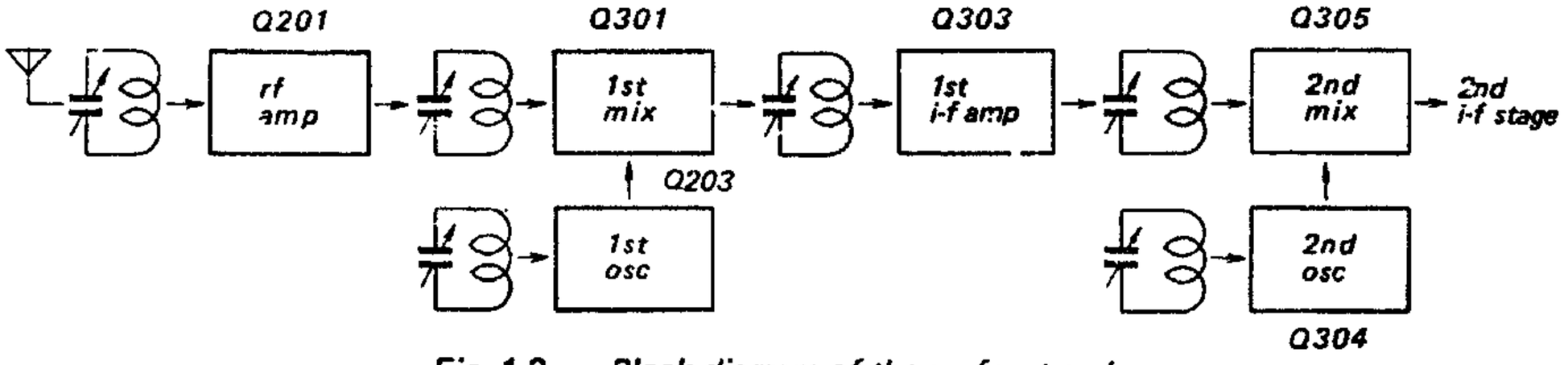

Fig. 1-3 Block diagram of the sw front end

Agc amp
Q202
D302

The agc (automatic gain control) circuit consists of transistor Q202 and diode D302. The carrier from the last stage of the i-f amplifier adds a negative agc voltage on the positively-biased base of transistor Q202 through diode D302 as shown in Fig. 1-4.

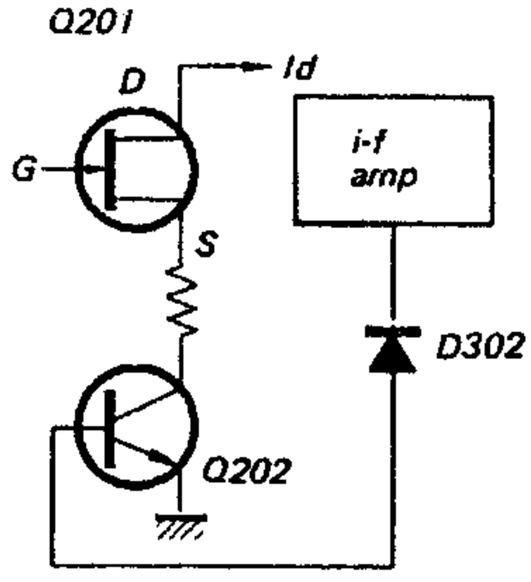

Fig. 1-4 Diagram of the agc

As the signal becomes stronger, the agc level becomes higher also.
Accordingly, the collector-current of Q202 and the drain-current of Q201 decrease. If the signal is small, Q202 increases the gain of rf amplifier Q201 and the desired sensitivity is obtained as shown in Fig. 1-5. In this way, the gain is controlled automatically.

1st local oscillator Q203

The oscillator generates a frequency 1.55 – 2.25 MHz higher than the incoming signal frequency, and injects the generated voltage at the emitter of Q301. The oscillator frequencies are fixed in each band.

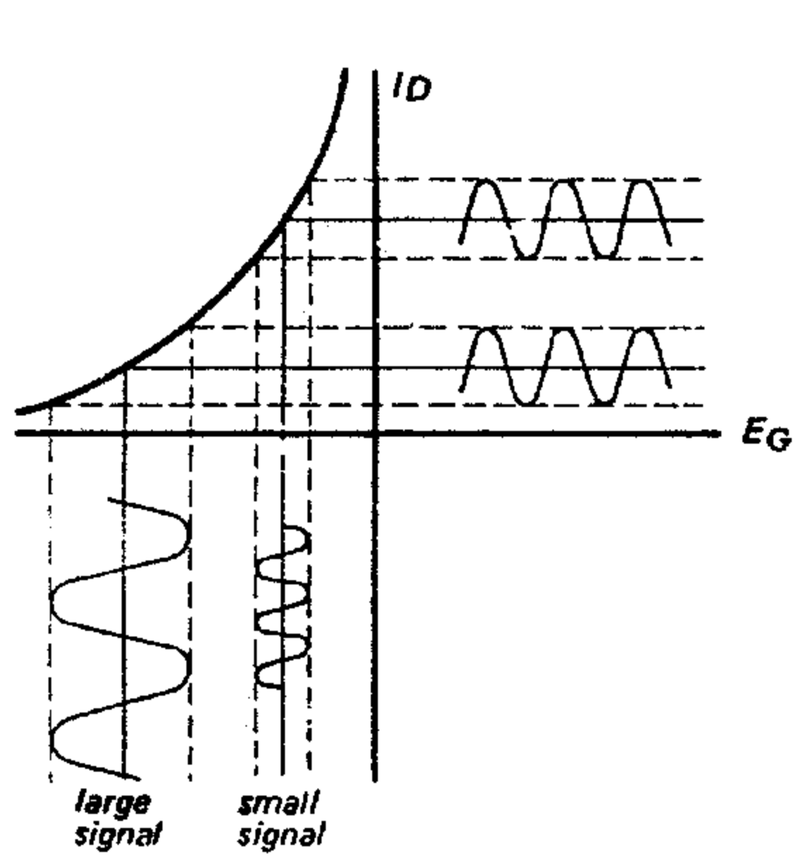

Fig. 1-5 Output waveform of the agc

I-f Strip

1st mixer Q301

Q301 combines the signal applied to its base with the oscillator voltage (1.55 – 2.25 MHz higher than incoming signal) applied to its emitter for conversion to the 1.55 – 2.25 MHz 1st i-f.

SW 1st i-f amplifier MW, LW, SW1 rf amplifier Q303

Q303 amplifies four a-m signals; 1.55 – 2.25 MHz (SW2 – SW10), 520 – 1,670 kHz (MW), 145 – 410 kHz (LW) and 1.6 – 4.5 MHz (SW1).

2nd oscillator Q304

Q304 generates a frequency 455 kHz higher than the signals that come from Q303.

Fm i-f amplifier Q302

Q302 amplifies the 10.7 MHz fm i-f signal coupled through ceramic filters CF301 and CF302. Also, the saturation due to high base to emitter bias clips the negative peak of the ac signal voltage developed at the collector of Q302.

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Limiter D301

This diode clips the positive peak of ac signal voltage developed at the collector of Q305.

Fm i-f amplifier

Q305 amplifies 10.7 MHz fm i-f signal. Also, Q305 produces a 455 kHz a-m i-f signal on its collector.

A-m 2nd mixer Q305

Power Supply

The CRF-160 uses a 4-pin ac cord for its power supply and has a power-in jack for a house current 100V, 120V, 220V and 240V (for USA and Canada model 120V only). However, by using the SONY DCC-2A Car Battery Cord or standard flashlight batteries (six size "D" cells), the CRF-160 can be operated away from an ac power outlet. Though diode D502 prevents a reverse current flow through the batteries when using a house current or car battery, it is better to remove the flashlight batteries if they will not be used for a while.

Selectivity Selector

The stage selectivity is obtained by using a ceramic filter (CF304) as a frequency-selective bypass centered at 455 kHz. This gives transistor Q306 a high gain at 455 kHz by preventing emitter degeneration of the signal at this frequency. By connecting capacitor C378 in parallel with filter CF304 (See Fig. 1-6), the BROAD selectivity bandwidth is obtained. When the SHARP position is set, the bandwidth becomes narrow. However, greater sensitivity with less noise is obtained and a weak signal can easily be heard.

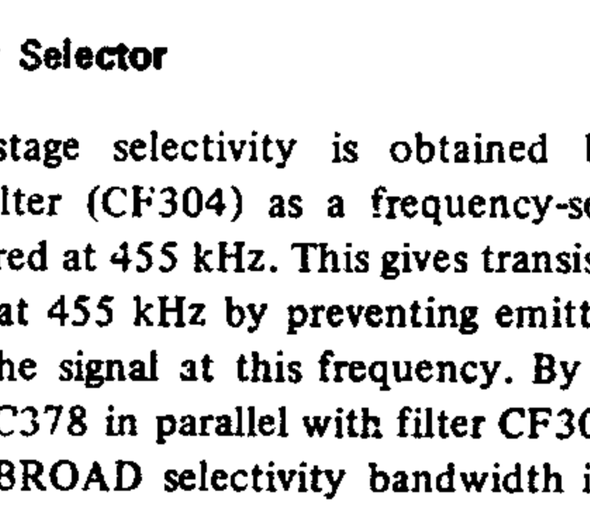


Fig. 1-6 Selectivity selection circuit

Audio Amplifier

VOLUME control VR601

The level of signal applied to the power amplifier is determined by the setting of VR601.

Amplifier Q401

Transistor Q401 amplifies the audio signal supplied by VOLUME control VR601.

Audio driver Q402, Q403

These direct-coupled stages amplify the audio signal supplied by TONE control VR602.

Power amplifier Q404, Q405

This stage uses an OTL (output transformerless) push-pull class-B amplifier. Thermistors Th401 and Th402 temperaturecompensate the base bias of Q404 and Q405.
Negative feedback from the output of Q404 and Q405 to the emitter of Q403 improves the frequency response and reduces distortion.

BFO (beat frequency oscillator) Circuit

To reproduce a SSB (single sideband) signal, this oscillator generates a frequency between 452 kHz and 458 kHz and injects the generated voltage into the base of transistor Q307. The BFO frequency is changed by varying the base bias of Q01 with VR02 (BFO PITCH control). The BFO center frequency is set with L01, and the BFO control range is set with VR02 (1 kΩ semi-fixed resistor). Thermistor Th01 compensates this oscillator for frequency drift caused by temperature variations.

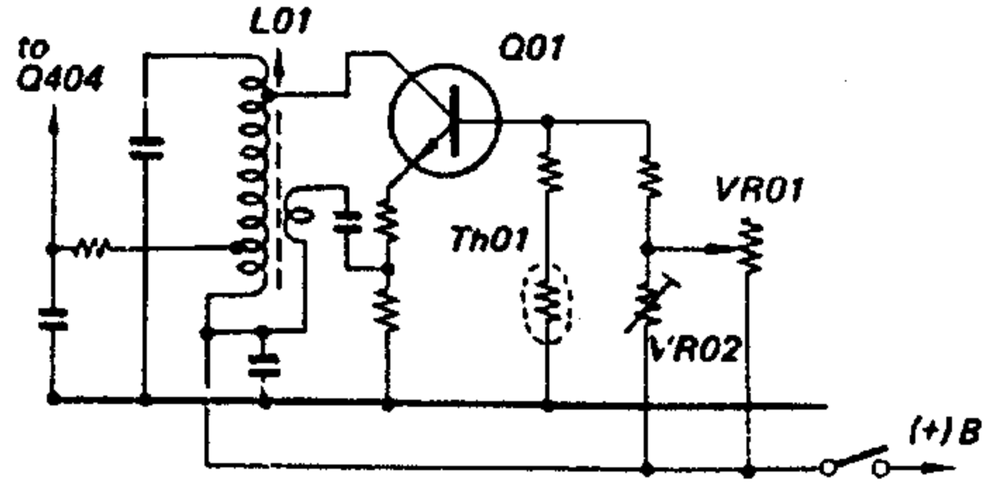
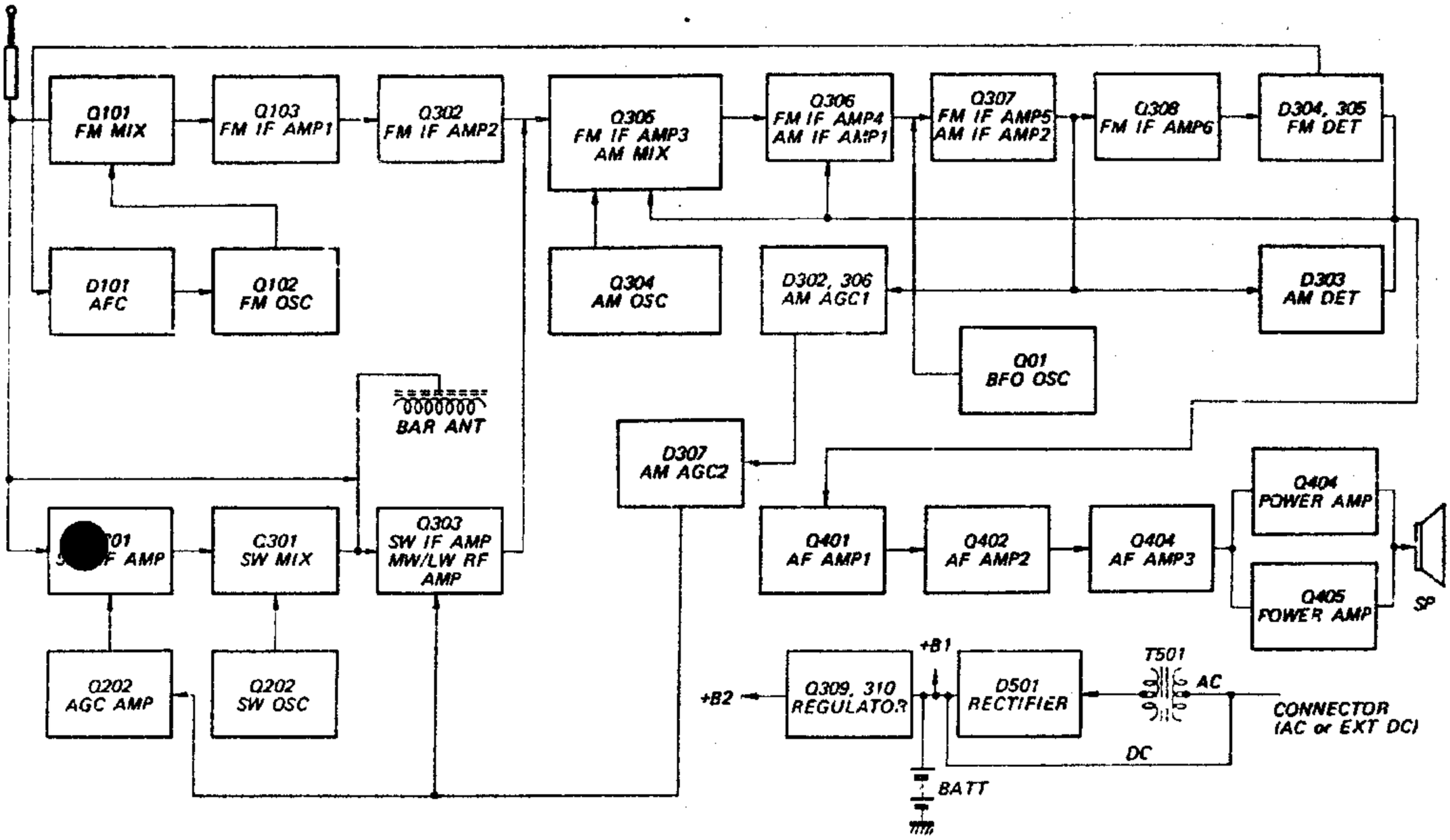


Fig. 1-7 BFO circuit

1-4. BLOCK DIAGRAM



— Hardware Nomenclature —

P – Pan Head Screw

PS – Pan Head Screw with Spring Washer

K – Flat Countersunk Head Screw

B – Binding Head Screw

RK – Oval Countersunk Head Screw

T – Truss Head Screw

R – Round Head Screw

F – Flat Fillister Head Screw

SC – Set Screw

E – Retaining Ring (E Washer)

W – Washer
SW – Spring Washer
LW – Lock Washer
N – Nut

– Example –

⊕ P 3x10
- Type of Slot
- Length in mm (L)
- Diameter in mm (D)
- Type of Head

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1-5. EXTERNAL VIEW

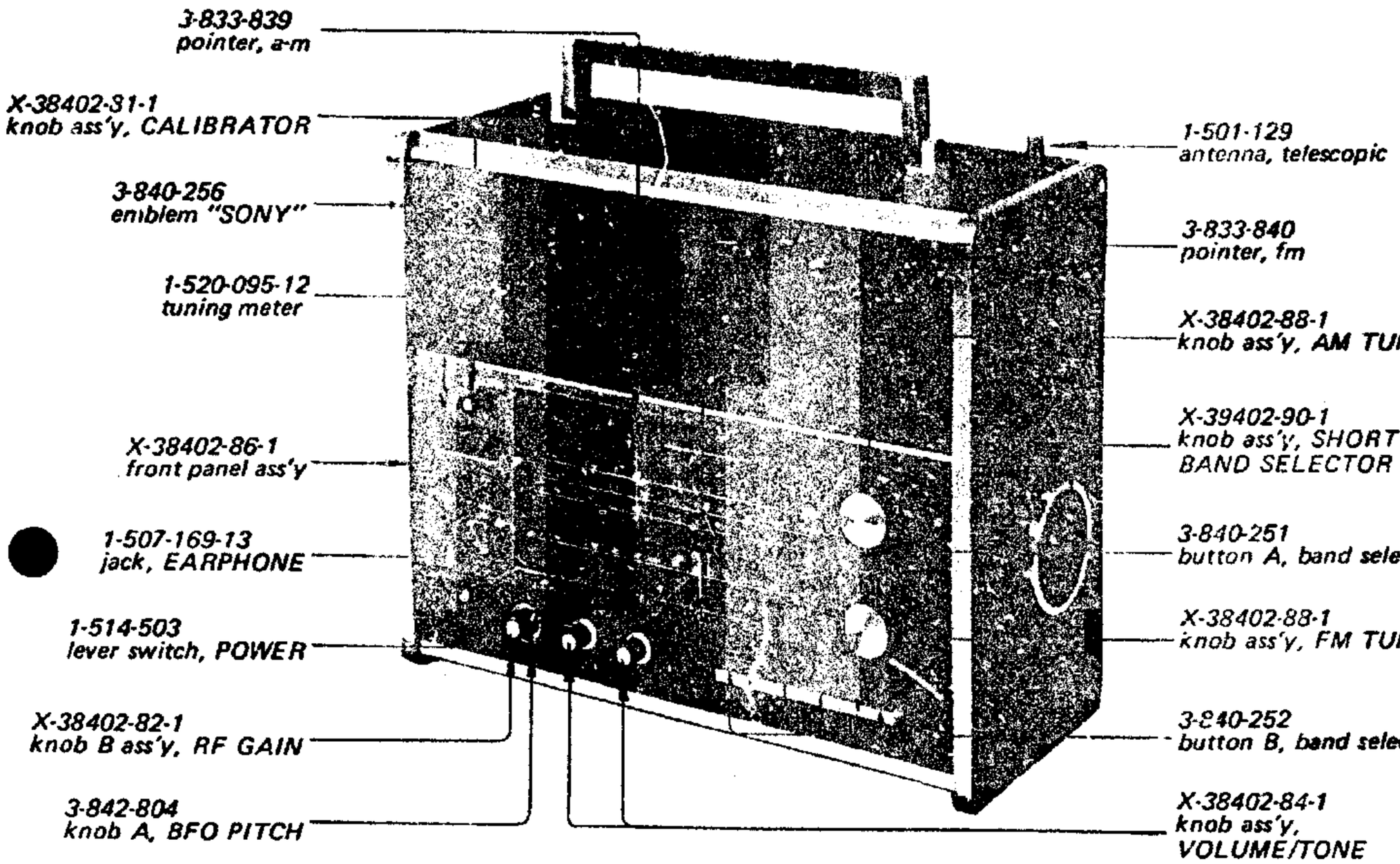

Fig. 1-8

1-6. MAJOR PARTS LOCATION

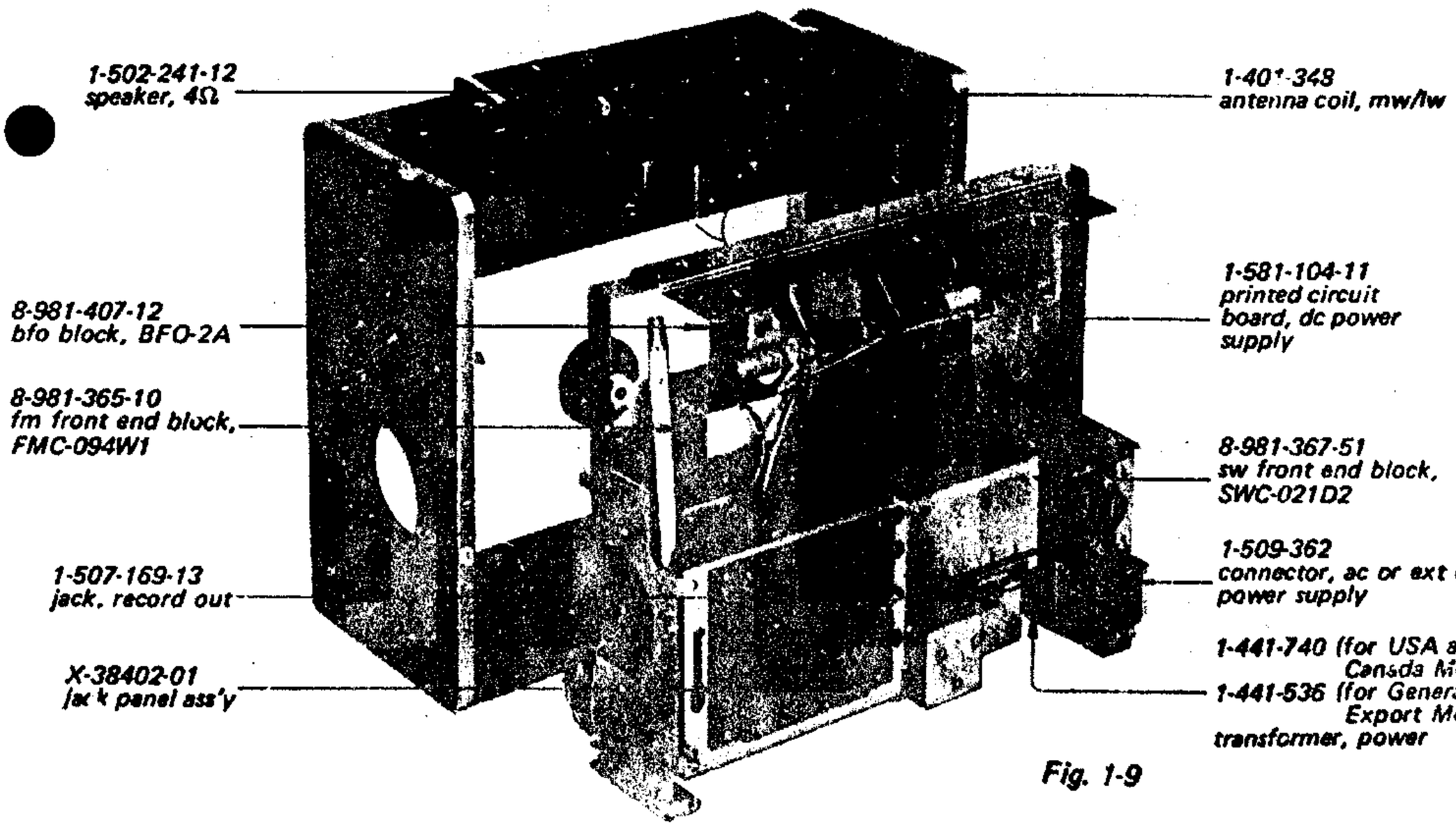

Fig. 1-9

SECTION 2
DISASSEMBLY

2-1. CHASSIS REMOVAL

1. Pull off the seven knobs shown in Fig. 2-1.

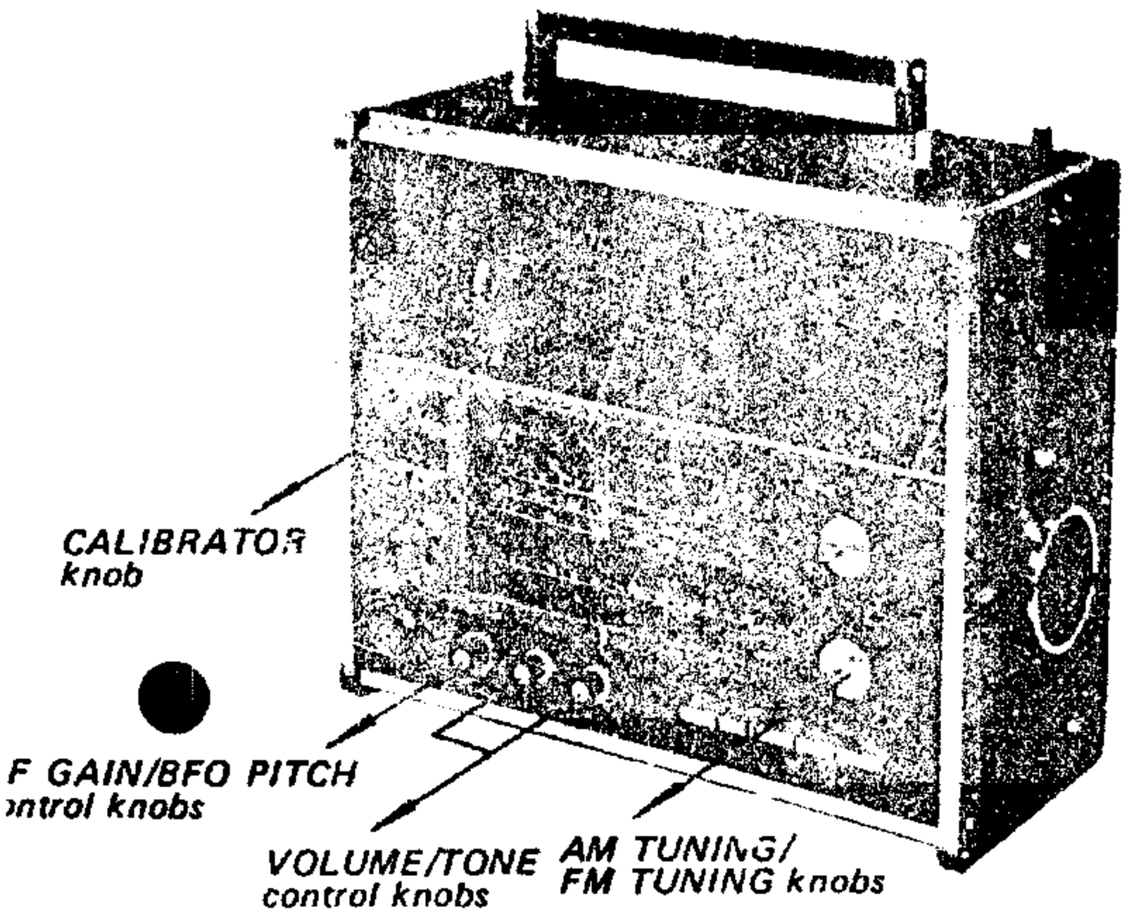

Fig. 2-1

2. Remove the battery lid and take out batteries and ac cord.
3. Remove the three screws shown in Fig. 2-2.

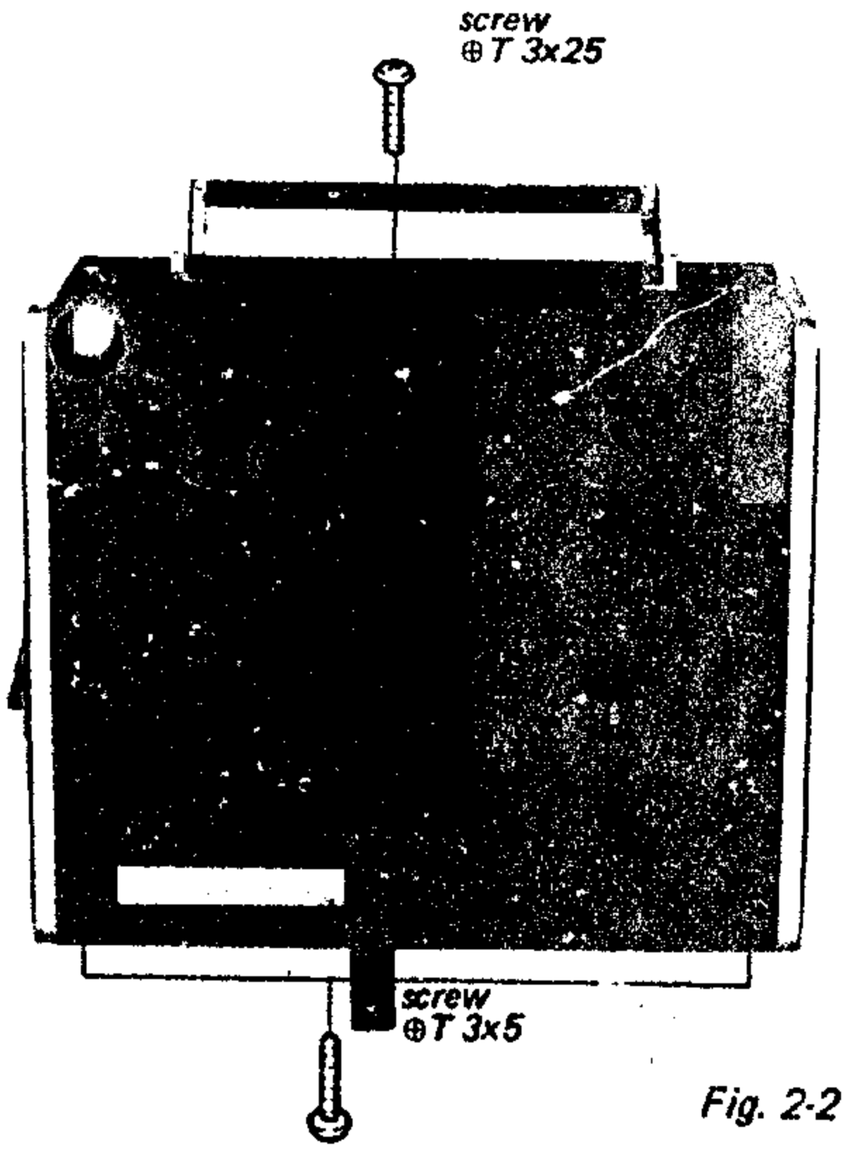

Fig. 2-2

4. Remove the six screws marked △ which fasten the front panel to the chassis in Fig. 2-3.
5. Loosen a screw marked ※ and remove the telescopic antenna.
6. Now, the front panel is removable as shown in Fig. 2-4.
7. Remove the three screws and two rubber foots as shown in Fig. 2-4.

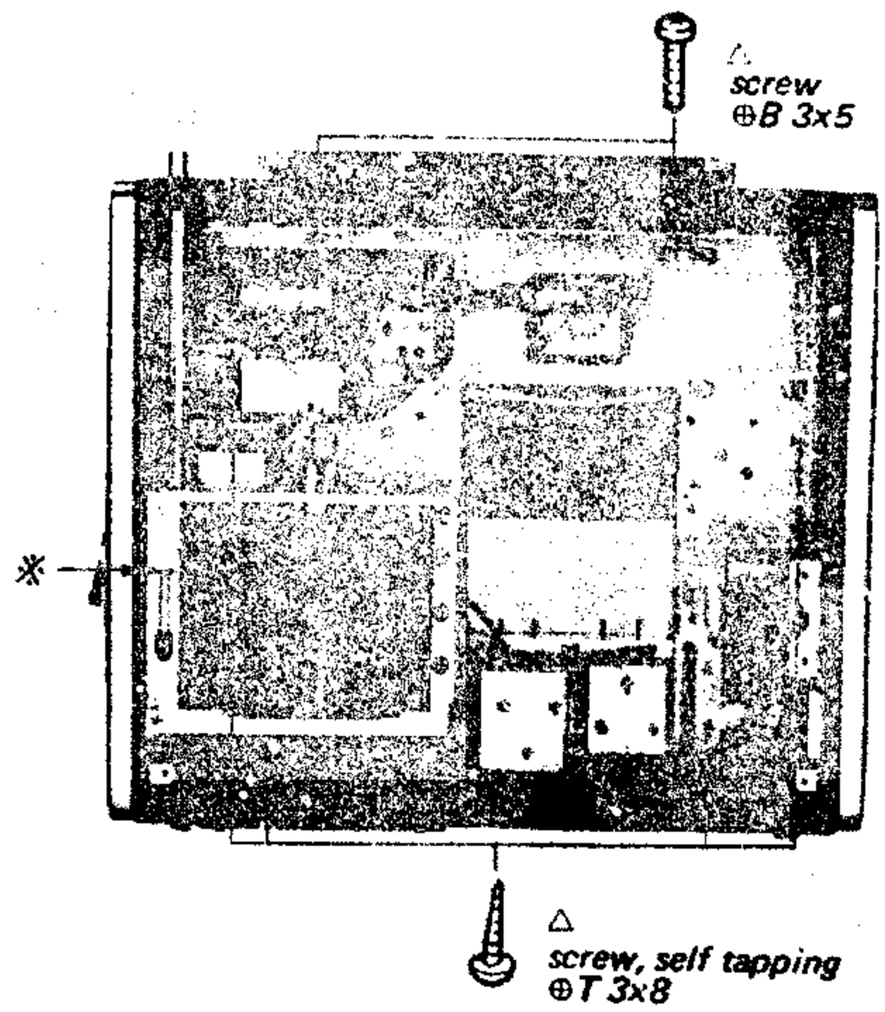

Fig. 2-3

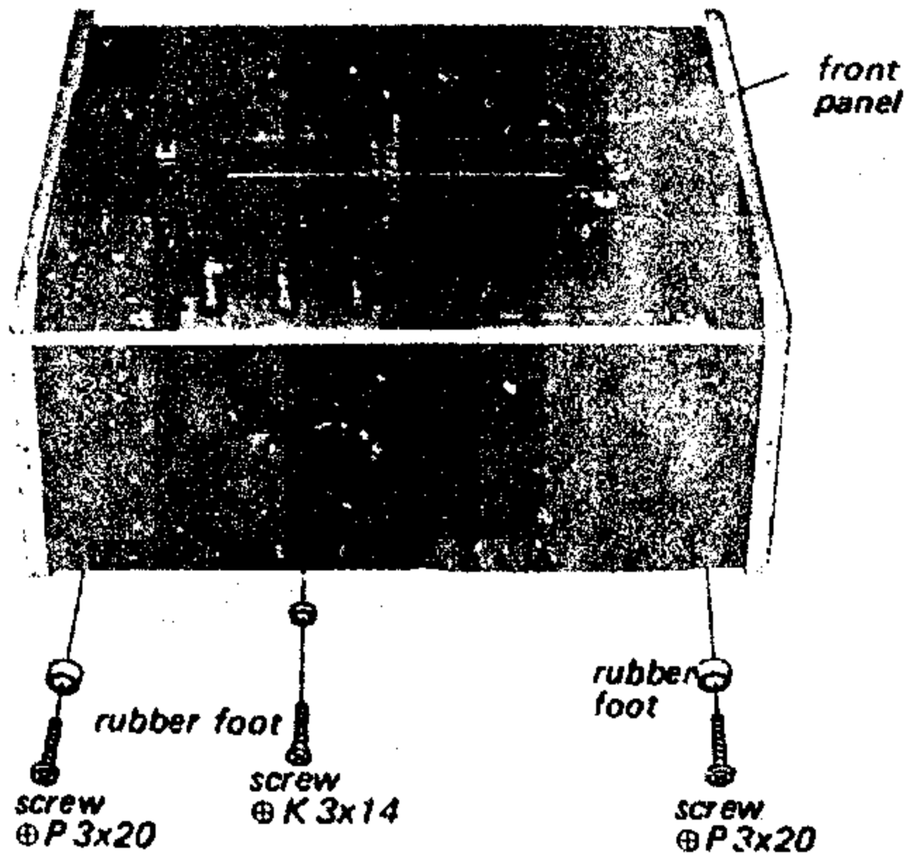

Fig. 2-4

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8. Loosen the three set screws and pull oft the sw band selector knob as shown in Fig. 2-5.
9. Now, the chassis is removable as shown in Fig. 2-6.

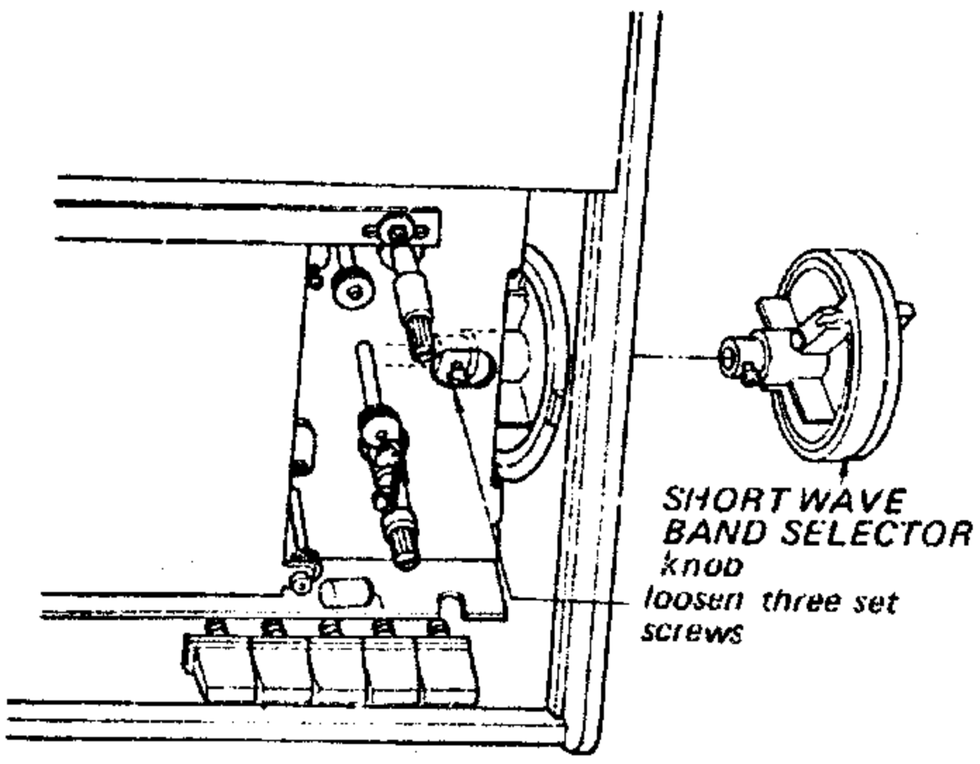

Fig. 2-5

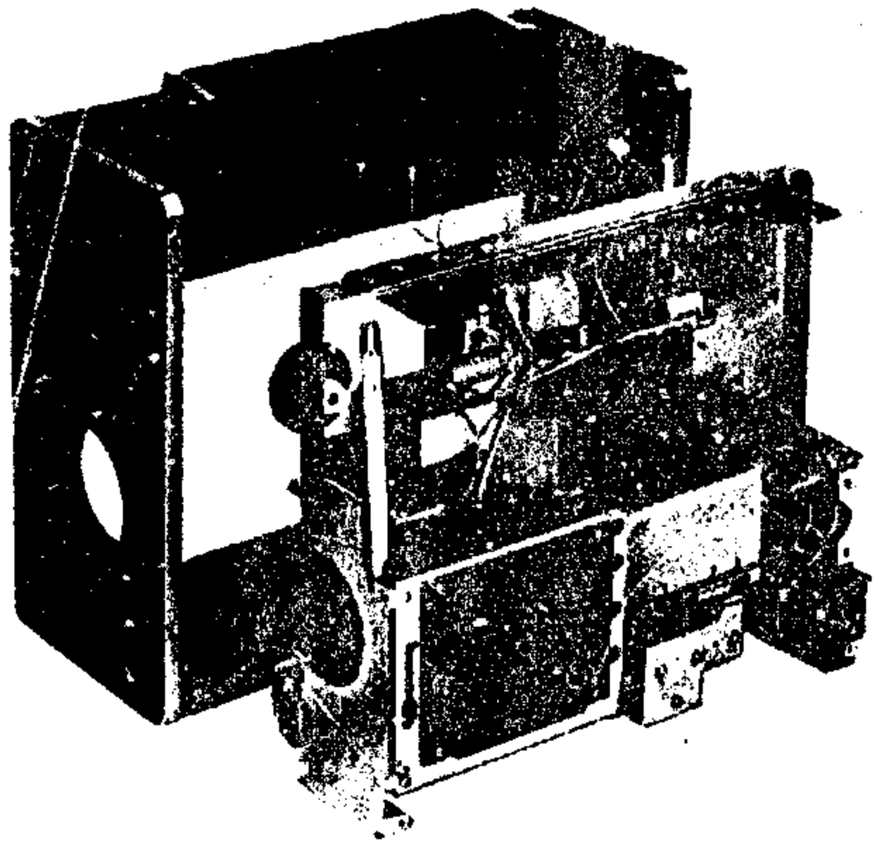

Fig. 2-6

2-2. FM FRONT END BLOCK REMOVAL

1. Remove the chassis.
2. Remove the seven screws marked ○ and △ in Fig. 2-7.
3. Remove the two screws marked ★.
4. Remove the screw marked ◎.
5. Unsolder the two soldered portions on the shield cover marked □.
6. Take out the shield cover and fm front end circuit board as illustrated in Fig. 2-7.

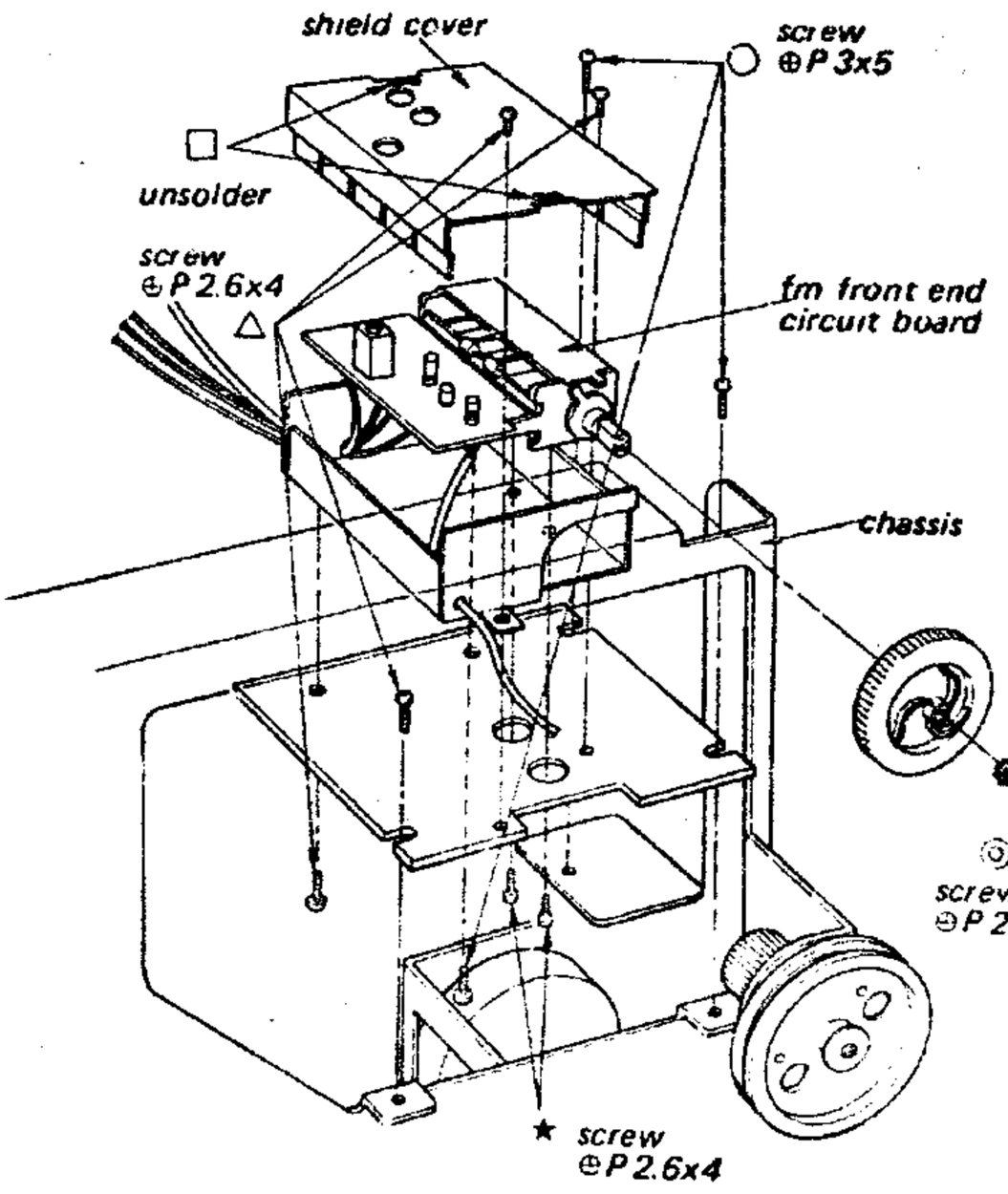

Fig. 2-7

2-3. SW FRONT END BLOCK REMOVAL

1. Remove the chassis.
2. Unsolder the ten lead wires shown in Fig. 2-8.

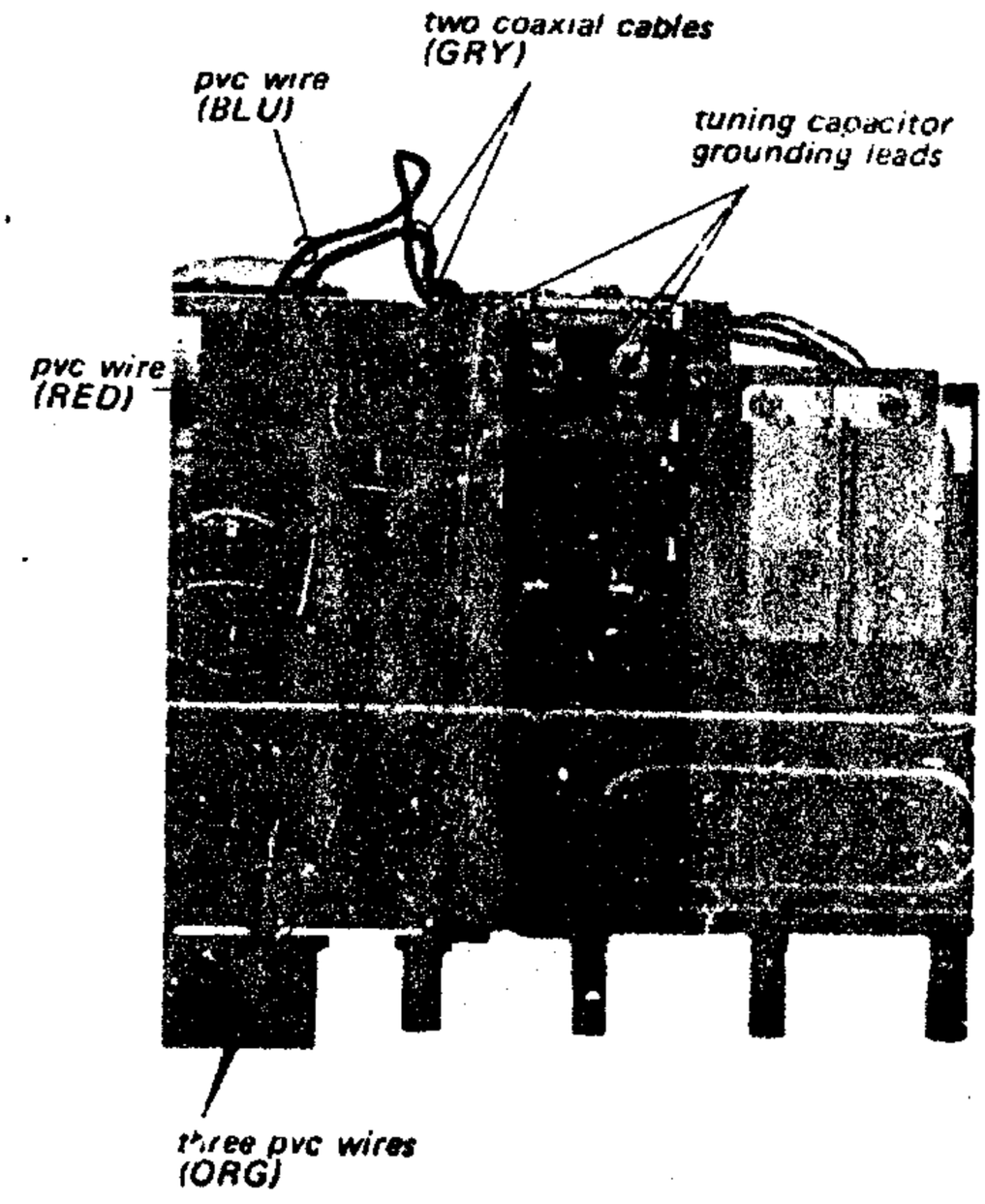

Fig. 2-8

3. Remove the six screws and the shield cover as shown in Fig. 2-9 and unsolder the two lead wires.
4. Loosen the two set screws marked ○.
5. Now, sw front end block is removable in the direction shown by the arrow.

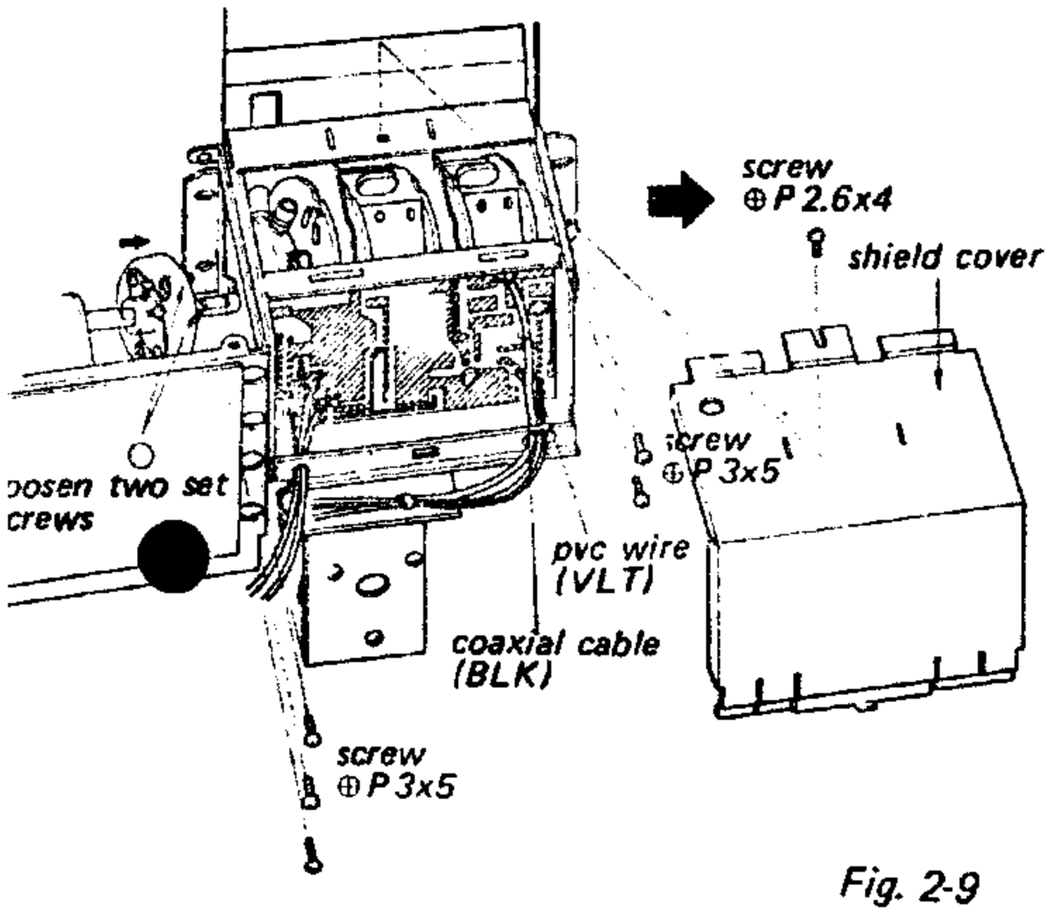

Fig. 2-9

2-4. CP/IF CIRCUIT BOARD REMOVAL

1. Unsolder the ten lead wires in Fig. 2-8 as sw tuner removal.
2. Unsolder the six lead wires at ferrite bar antenna as shown in Fig. 2-10.

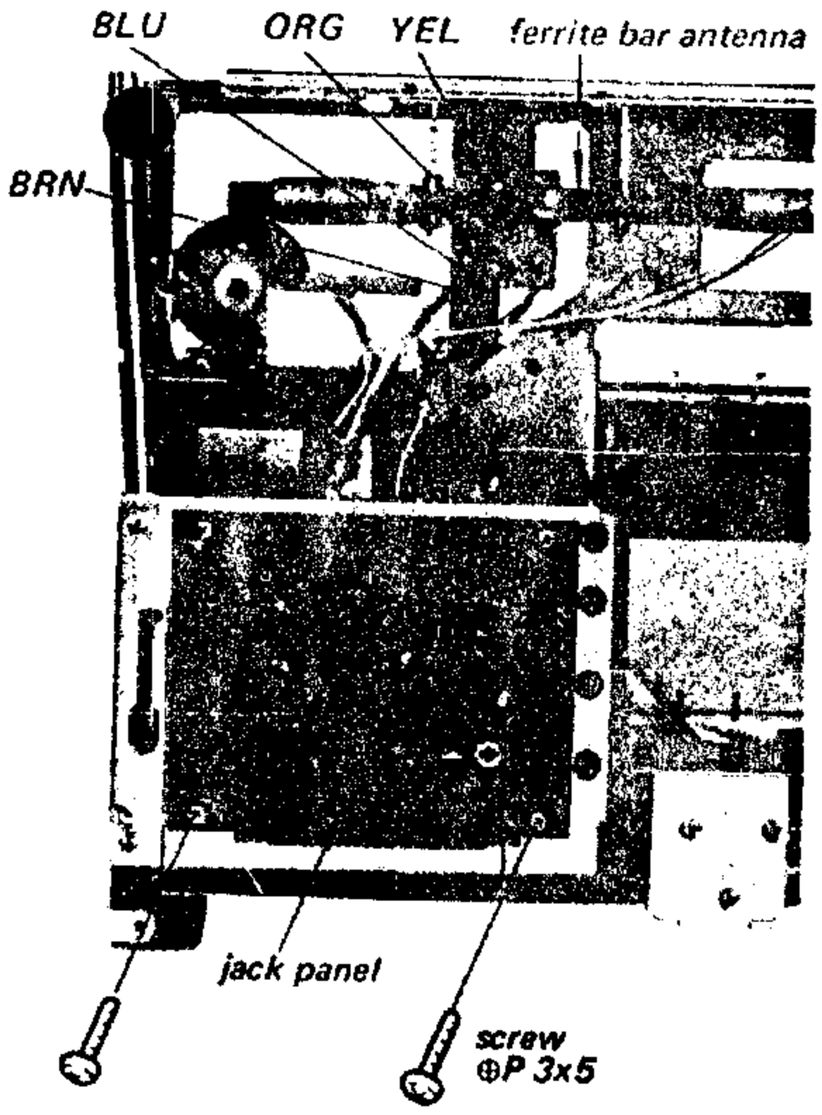

Fig. 2-10

3. Remove the four screws at the jack panel as illustrated in Fig. 2-10 and unsolder the nine lead wires shown in Fig. 2-11.
4. Remove the three screws shown in Fig. 2-12.
5. Unsolder the three lead wires.
6. Loosen the four lead wires from the lead wire holding lug.
7. Slide off the cp/i-f circuit board in the direction shown by the arrow in Fig. 2-12.

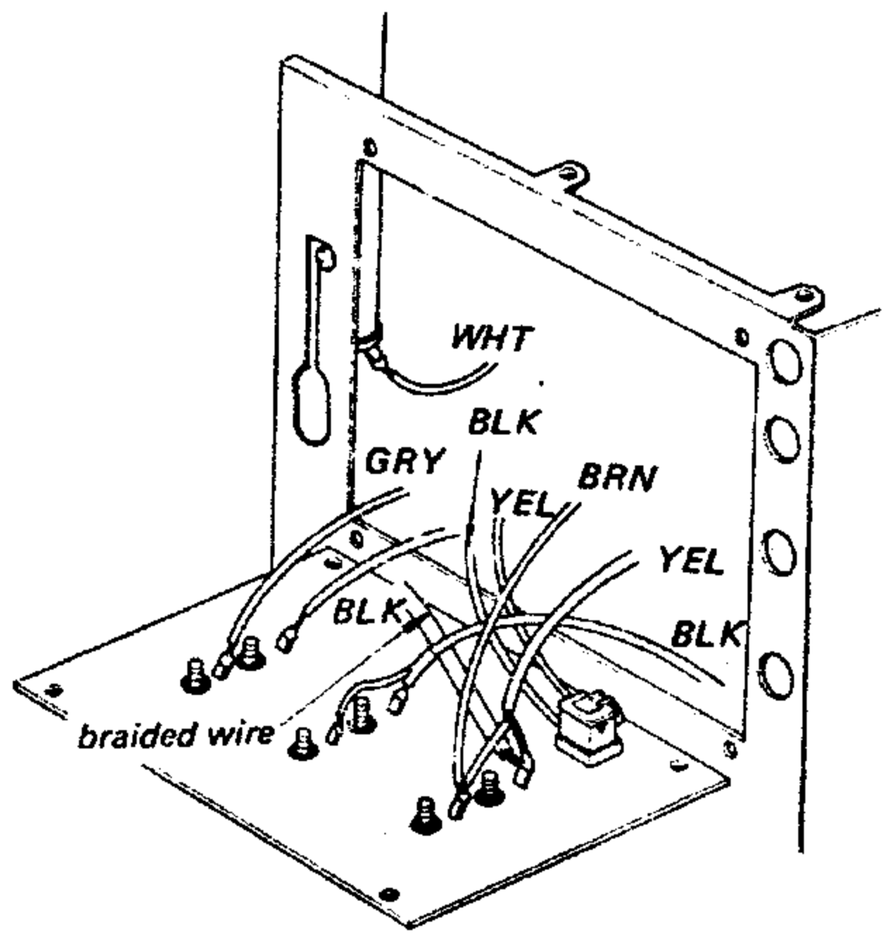

Fig. 2-11

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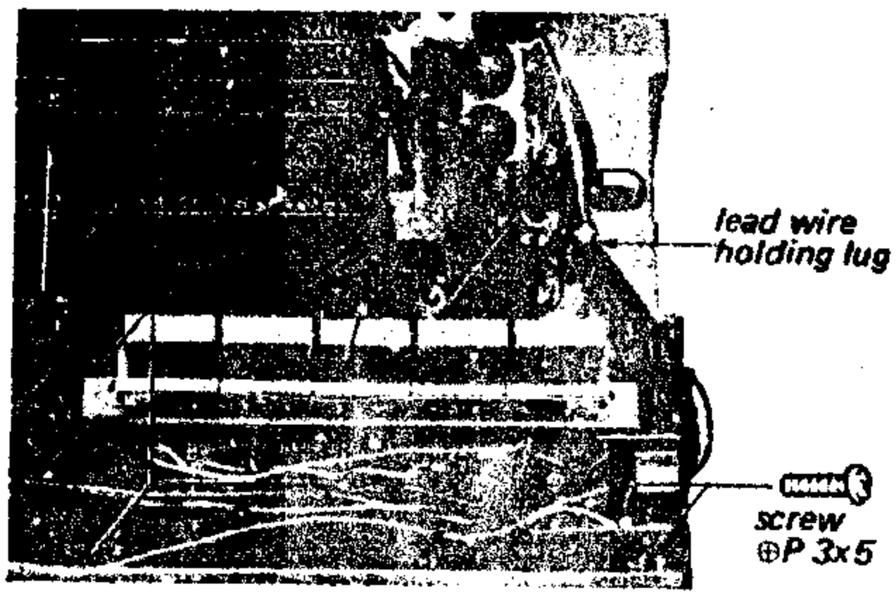

Fig. 2-12

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2-5. DC POWER SUPPLY CIRCUIT BOARD REMOVAL

1. Remove the two screws shown in Fig. 2-13.
2. Turn the circuit board in the direction shown by the arrow.

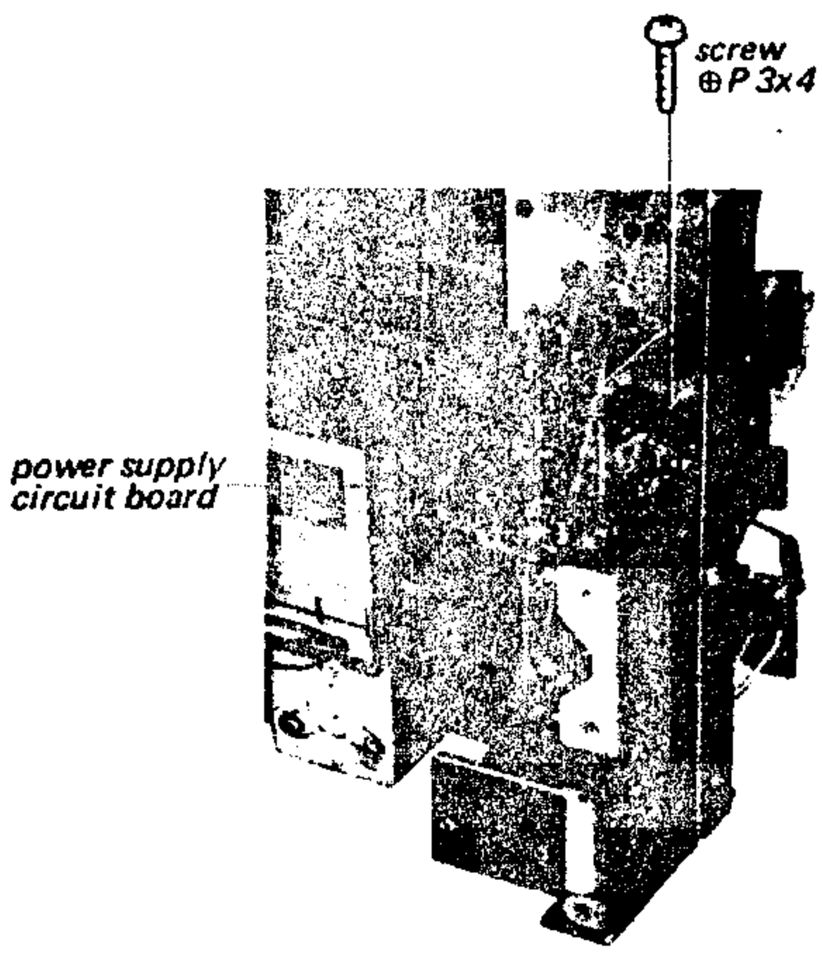

Fig. 2-13

2-6. AF CIRCUIT BOARD REMOVAL

1. Remove the five screws shown in Fig. 2-14.
2. Remove the circuit board in the direction shown by the arrow.

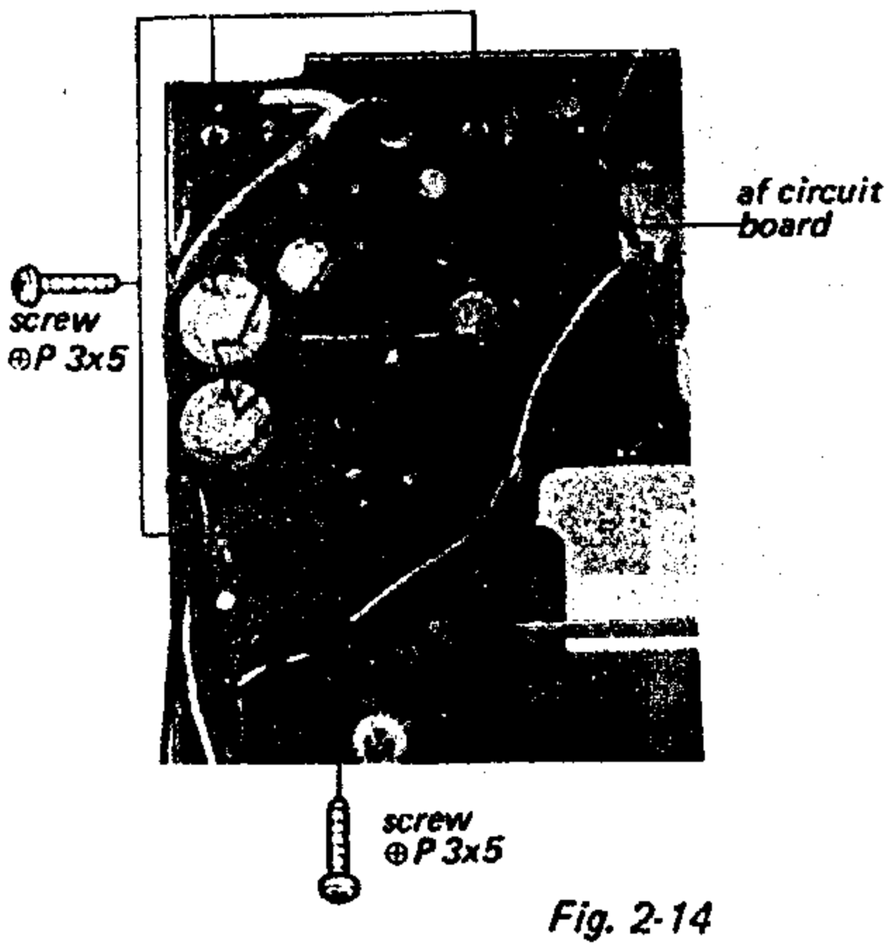

Fig. 2-14

2-7. DIAL SCALE AND DIAL DRUM REMOVAL

1. Remove the chassis.
2. Remove the four screws shown in Fig. 2-15.
3. Release the pointers from dial cords.

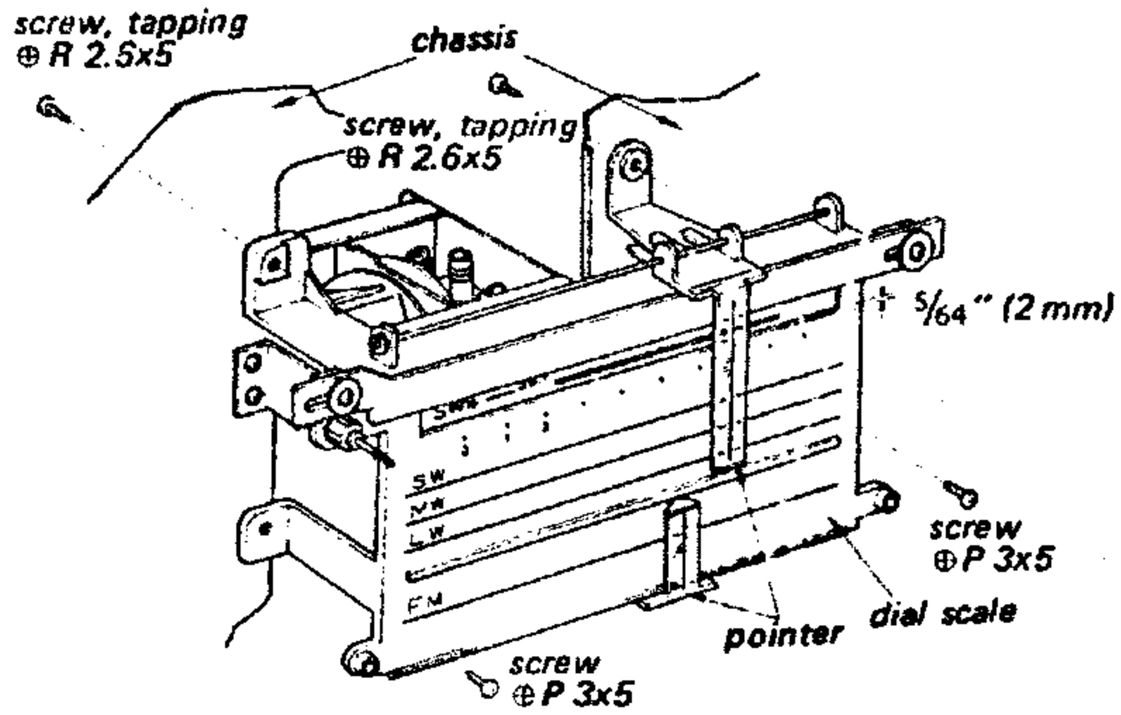

Fig. 2-15

4. Remove the dial scale.
5. Remove the drum holder A by removing the two screws marked ◎ in Fig. 2-16.
6. Release the two screws marked ☆ in Fig. 2-16.
7. Pull the dial drum towards you.

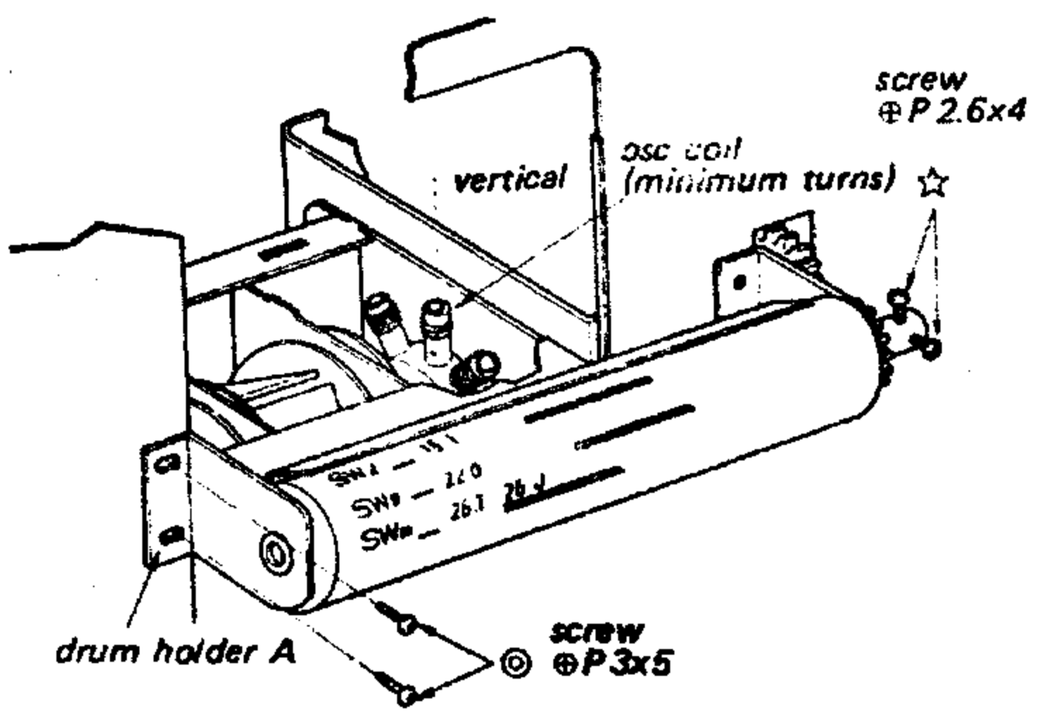

Fig. 2-16

Dial Drum Reassembly

1. Turn the sw band selector so that the osc coil which has the minimum turns comes to the vertical position as shown in Fig. 2-16.
2. Attach the dial drum to the drum holders setting the two screws marked ◎ in Fig. 2-16.
3. Set the dial scale.
4. Turn the dial drum so that the drum indicates SW10 and the distance between the dial scale and the line on the drum becomes 5/64 inches (2mm) as shown in Fig. 2-15.
5. Fasten the two screws marked ☆ in Fig. 2-16.

2-8. AC POWER SUPPLY CIRCUIT BOARD REMOVAL

1. Remove the six screws shown in Fig. 2-17 and pull the power supply block in the direction shown by the arrow.
2. Remove the screw shown in Fig. 2-18.
3. Now, the ac power supply circuit board is removable.

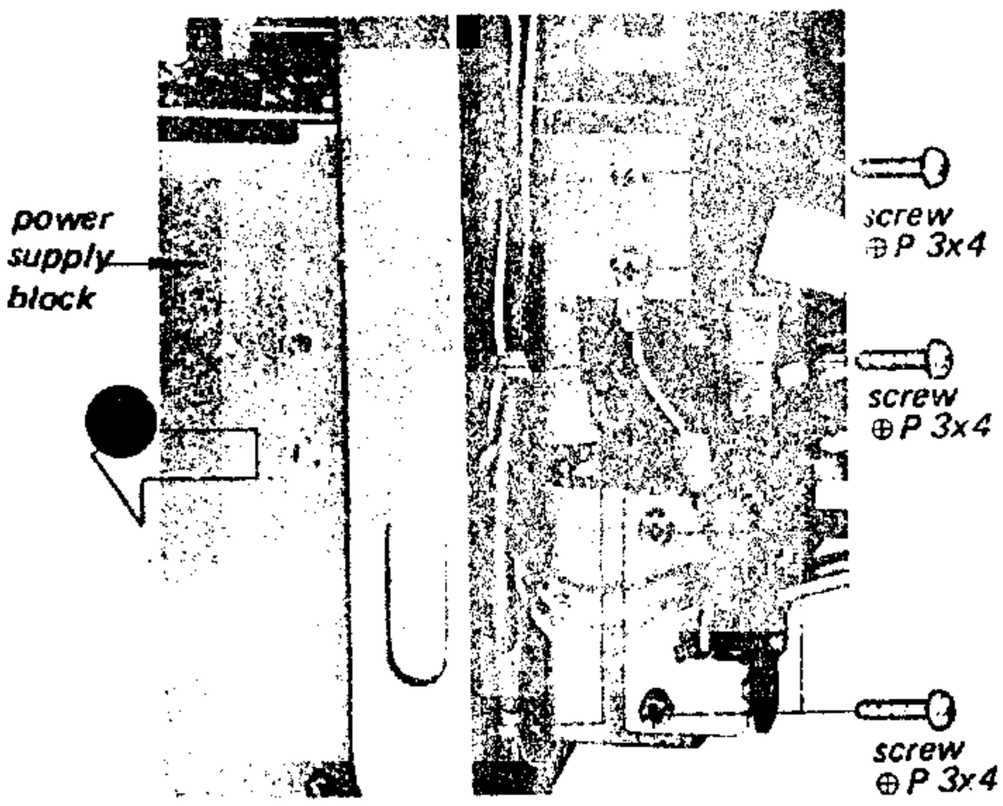

Fig. 2-17

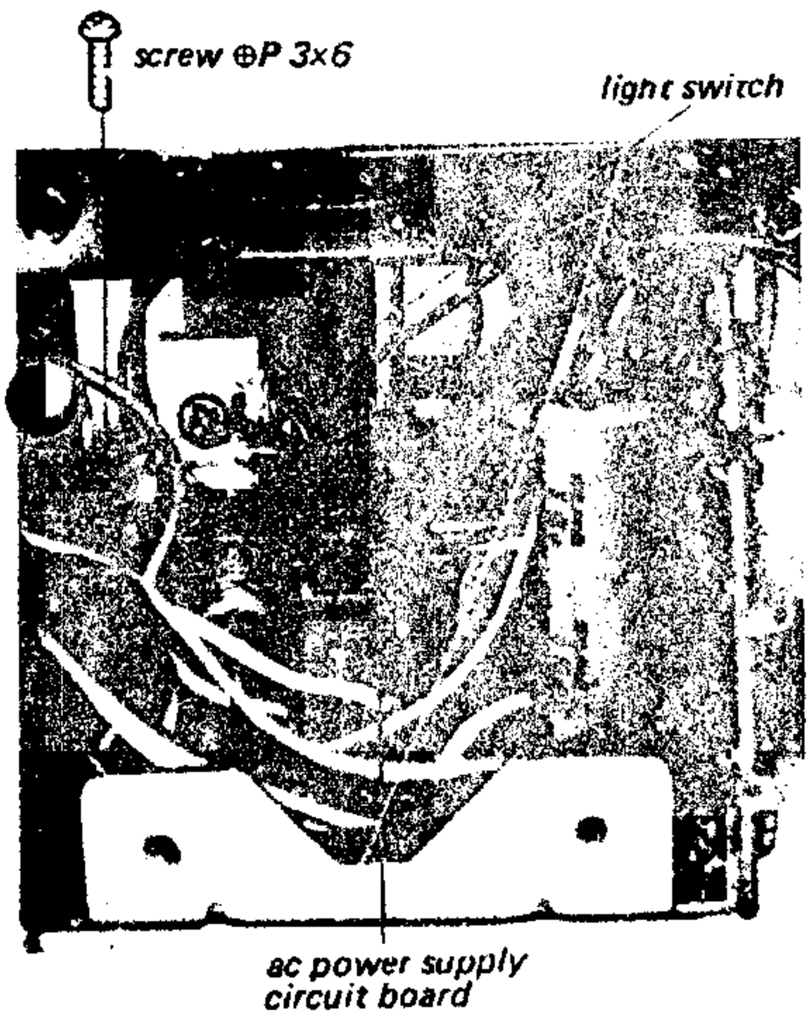

Fig. 2-18

2-9. BFO BLOCK REMOVAL

1. Remove the step screw.
2. Remove the bfo block.

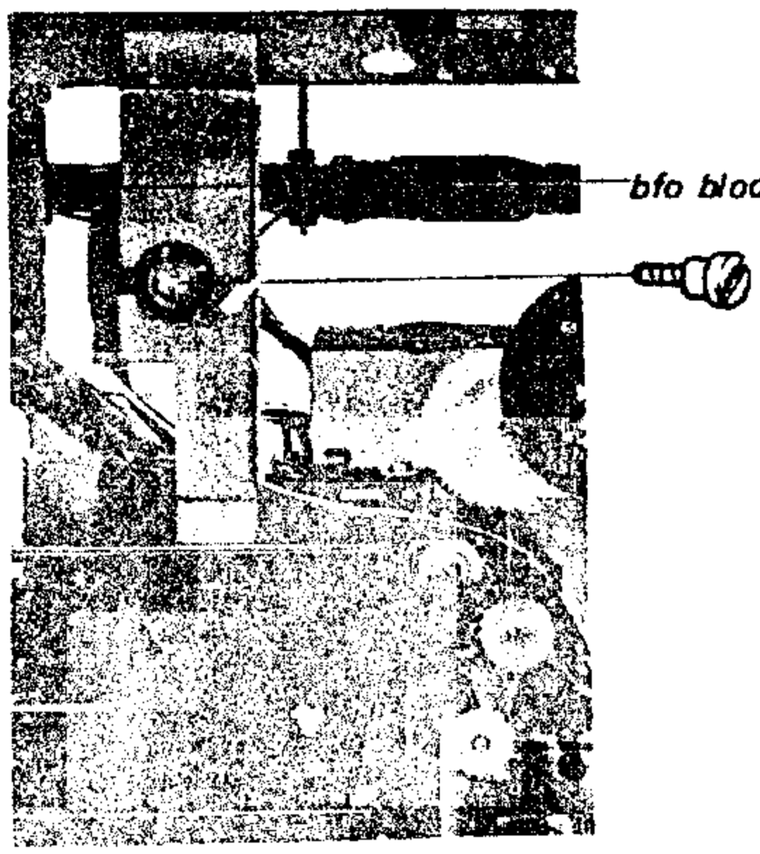

Fig. 2-19

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2-10. DIAL CORD RESTRINGING

Preparation

1. Remove the chassis.
2. Remove the four screws shown in Fig. 2-20 and take out the dial scale.
3. Remove the volume holder by removing the two screws as shown in Fig. 2-21.

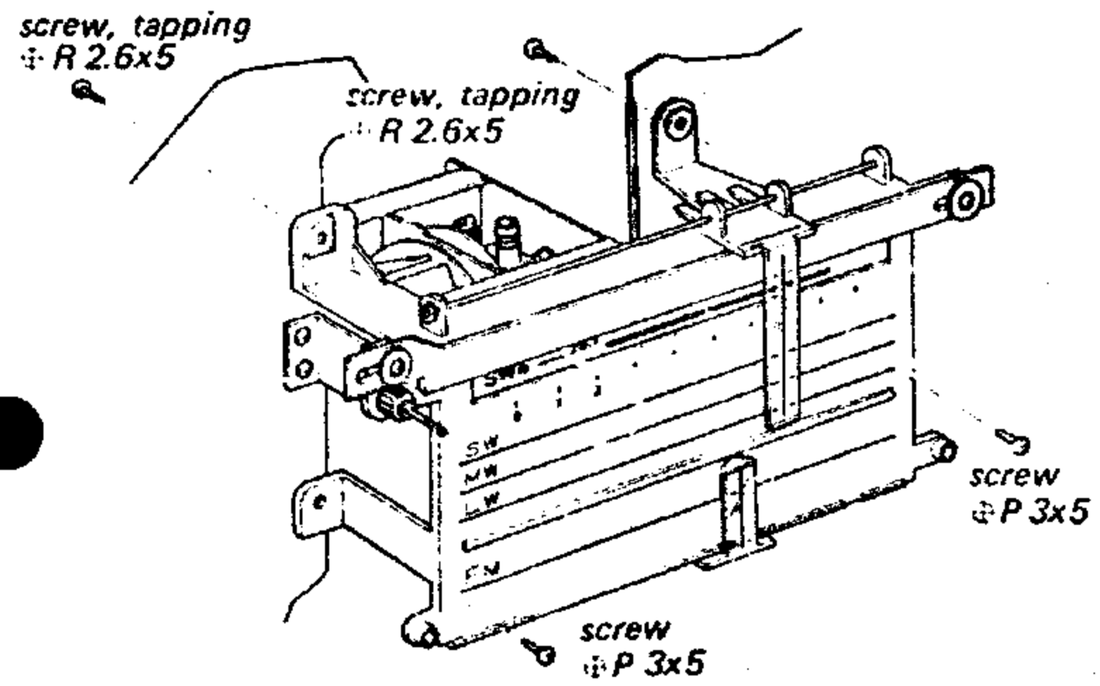

Fig. 2-20

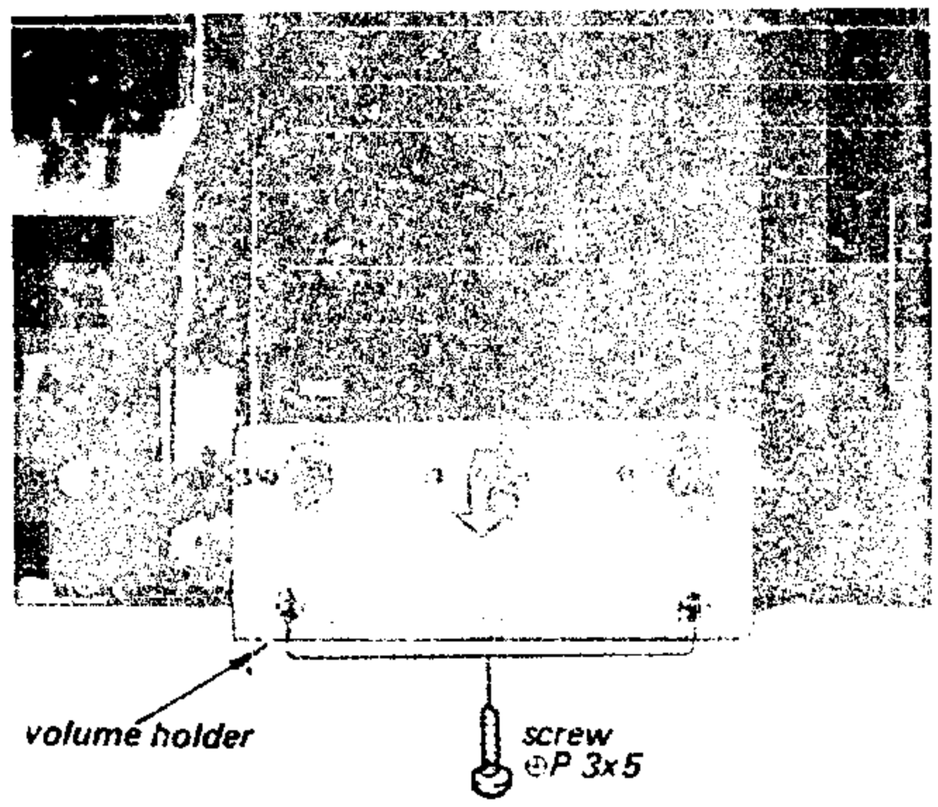

Fig. 2-21

4. Rotate the driving pulley for a-m bands fully clockwise to its minimum capacitance position as shown in Fig. 2-22.
5. Rotate the driving pulley for fm band fully counterclockwise to its minimum capacitance position as shown in Fig. 2-23.

1. A-m Tuning Capacitor Driving Cord

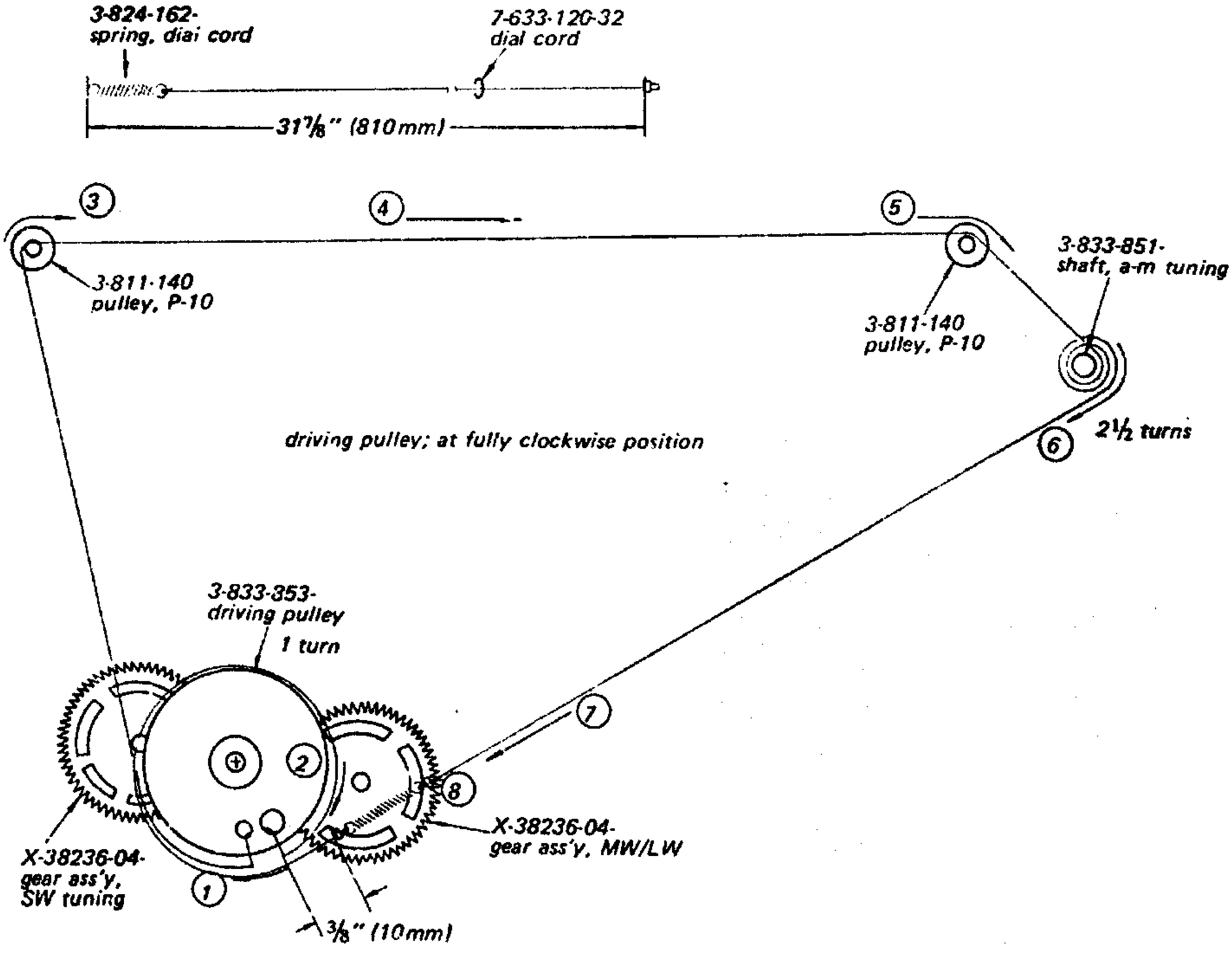

Fig. 2-22

2. Fm Tuning Capacitor Driving Cord

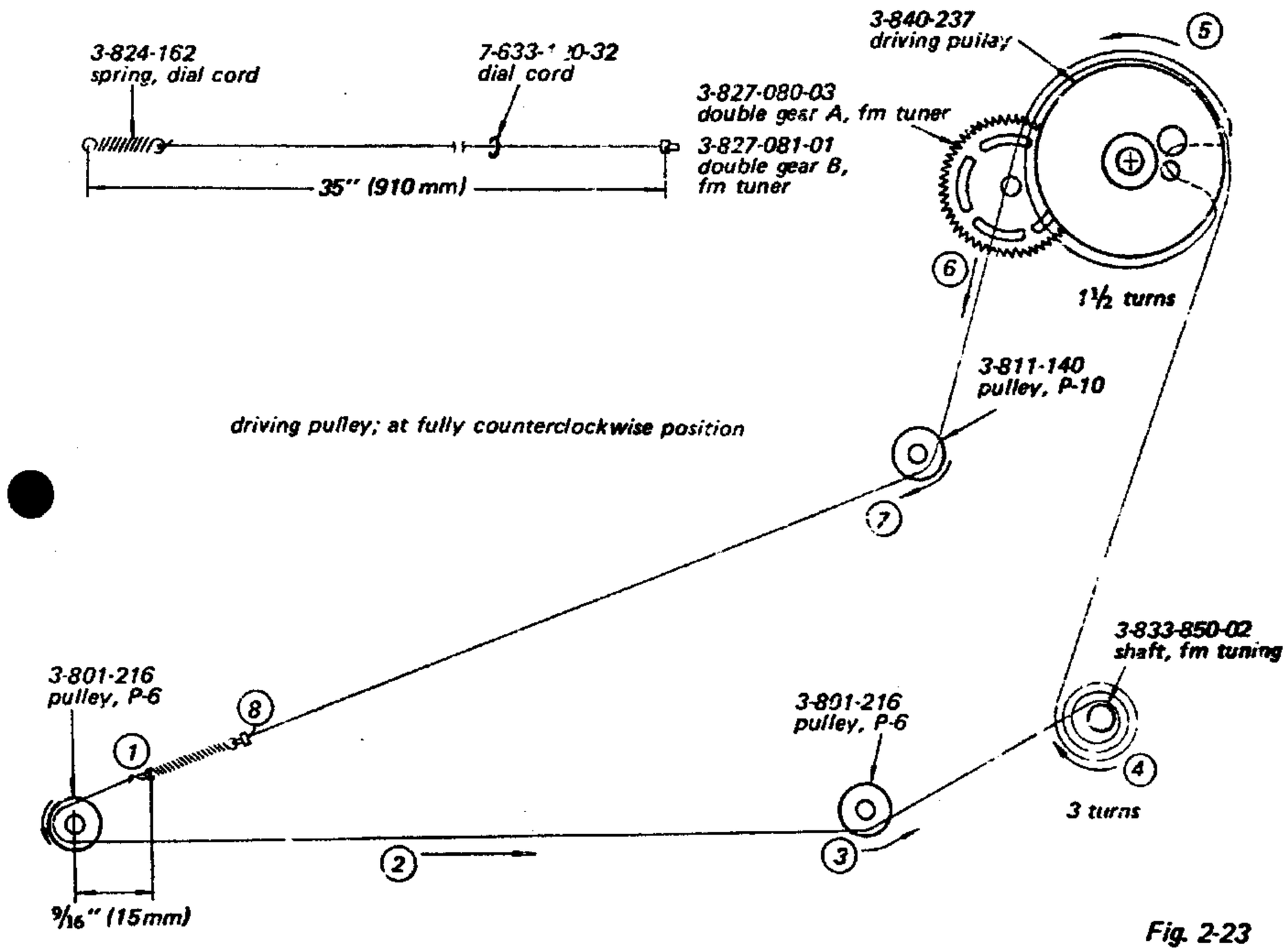

Fig. 2-23

3. Pointer Setting

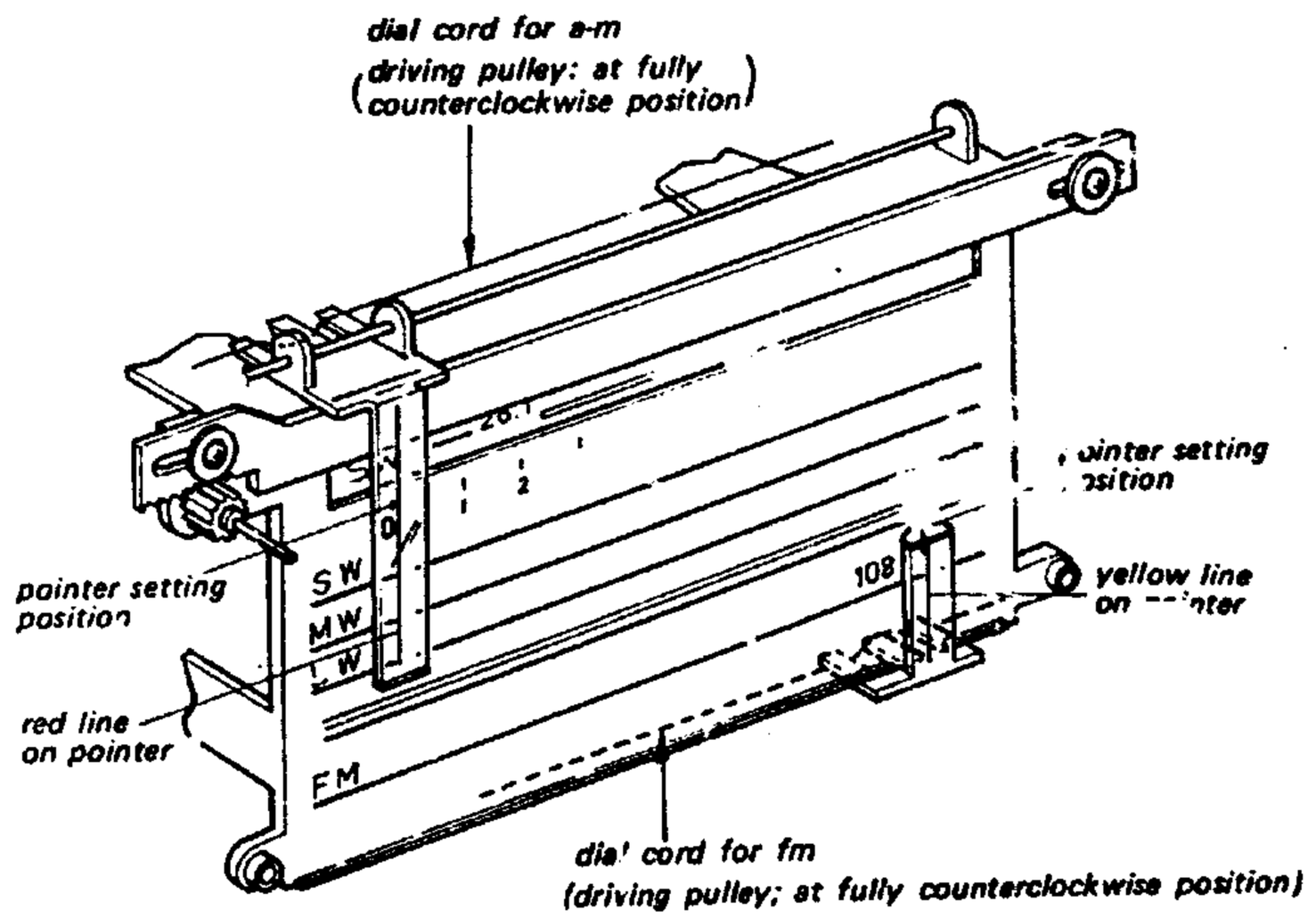

Fig. 2-24

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SECTION 3
CIRCUIT ADJUSTMENTS

3-1. IF ALIGNMENT

Test Equipment/Tools Required: 10.7 MHz Sweep Generator
Rf signal generator (for fm and a-m)
Oscilloscope
VTVM
Loop antenna
Screwdriver for alignment

1. FM IF ALIGNMENT

Preparation: Band selector: FM
AFC: OFF
SELECTIVITY: SHARP

Sweep Generator Coupling	Sweep Generator Frequency	Oscilloscope Connection	Adjust	Remarks
Direct connection to FM 50~300Ω ext. ant. terminals (See Fig. 3-1.)	10.7 MHz	record out jack	IFT F101 IFT F301 IFT F302 IFT F303 IFT F304	Adjust for maximum amplitude and symmetrical "S" curve on the scope. (See Fig. 3-2.)

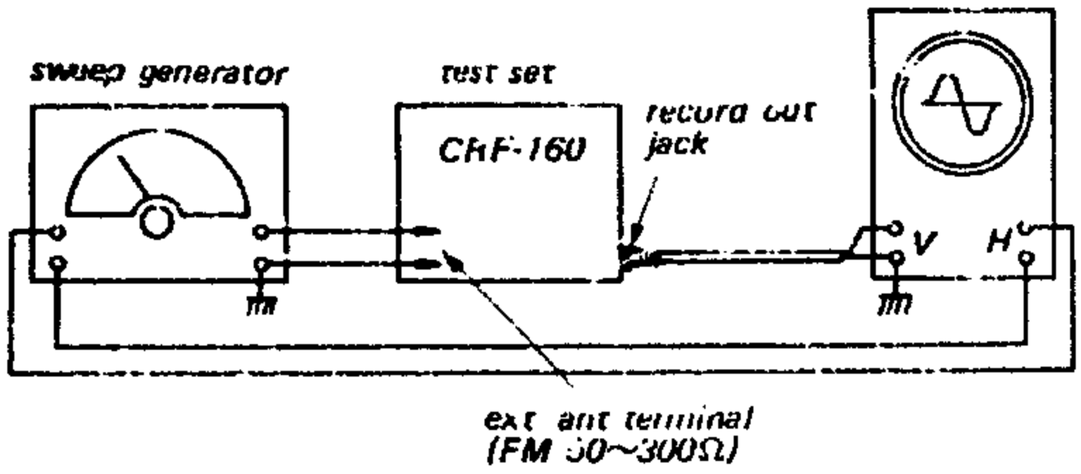

Fig. 3-1 Fm i-f alignment setup

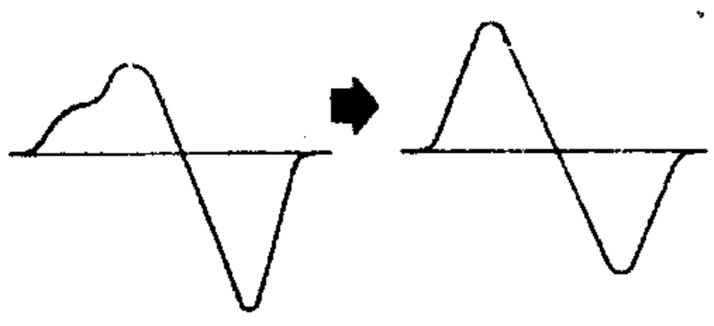

Fig. 3-2 "S" curve on oscilloscope

2. AM IF ALIGNMENT

Preparation: Band selector: MW
AM TUNING knob: fully clockwise position

Rf Signal Generator Coupling	Rf Signal Generator Frequency	VTVM Connection	Adjust	Remarks
Loop antenna (See Fig. 3-3.)	455 kHz (1 kHz 30% a-m modulated)	EARPHONE jack with 8Ω load resistor in parallel	IFT A301	Adjust for maximum meter reading.

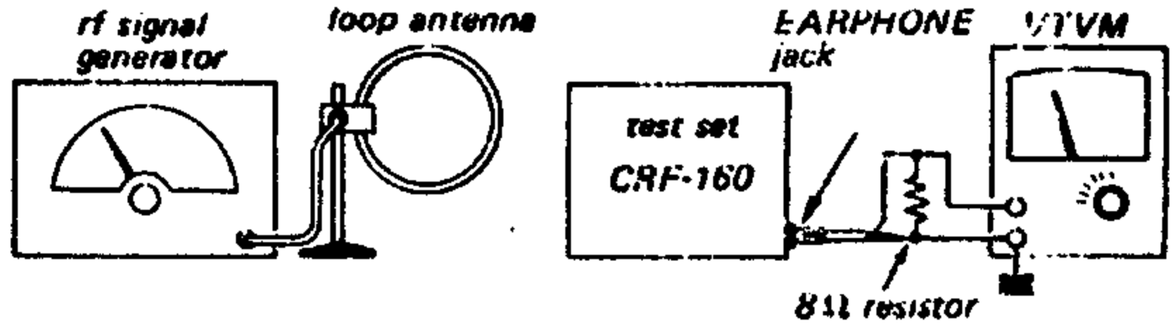

Fig. 3-3 A-m i-f alignment, MW/LW frequency coverage and tracking adjustment setup

3-2. FREQUENCY COVERAGE AND TRACKING ADJUSTMENTS

Preparation: VTVM connection: To EARPHONE jack with 8Ω load resistor in parallel
Modulation: FM ..... 400 Hz ± 22.5 kHz frequency-modulated signal
AM ..... 1 kHz 30% amplitude-modulated signal
AFC: OFF
SELECTIVITY: SHARP

Note: Fm frequency coverage is changed by adjusting osc coil (L104) and osc trimmer (CT1-4) with the intended frequency signal from the rf signal generator.

Adjustment	Rf Signal Generator Coupling	Rf Signal Generator Frequency	Receiver Dial Setting	Adjust	Remarks
FM Frequency Coverage	Direct connection to ext. ant. terminal (FM 50~300Ω) See Fig. 3-4.	86.5 MHz	Fully left	FM osc coil L104	Band Selector: FM Adjust for maximum meter reading.
		109.5 MHz	Fully right	FM osc trimmer CT1–4	
FM Tracking	The special test equipment required for this adjustment makes this strictly a factory adjustment.				
MW Frequency Coverage	Loop antenna See Fig. 3-3.	523 kHz	Fully left	MW osc coil L312	Band Selector: MW Adjust for maximum meter reading.
		1,660 kHz	Fully right	MW osc trimmer CT309	
MW Tracking		620 kHz	Tune to 620 kHz signal	MW ant coil L304–1 MW rf coil L308	
		1,400 kHz	Tune to 1,400 kHz signal	MW ant trimmer CT301–2 MW rf trimmer CT305	
LW Frequency Coverage	– ditto –	145 kHz	Fully left	LW osc coil L313	Band Selector: LW Adjust for maximum meter reading.
		410 kHz	Fully right	LW osc trimmer CT310	
LW Tracking		160 kHz	Tune to 160 kHz	LW ant coil L304–2 LW rf coil L309	
		350 kHz	Tune to 350 kHz	LW ant trimmer CT301–3 LW rf trimmer CT306	
SW1 Frequency Coverage	Direct connection to ext. ant. terminal See Fig. 3-5.	1.55 MHz	Fully left	SW1 osc coil L311	Band Selector: SW1 Unsolder a blue lead shown in Fig. 3-6. Adjust for maximum meter reading.
		4.55 MHz	Fully right	SW1 osc trimmer CT308	
SW1 Tracking		1.8 MHz	Tune to 1.8 MHz	SW1 ant coil L303 SW1 rf coil L307	
		4.0 MHz	Tune to 4.0 MHz	SW1 ant trimmer CT301–1 SW1 rf trimmer CT304	

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Adjustment	Rf Signal Generator Coupling	Rf Signal Generator Frequency	Receiver Dial Setting	Adjust	Remarks
SW2–SW10 1st IF Frequency Coverage	To the base of Q301 through a capacitor 0.01 – 0.04μF See Fig. 3-7 and Fig. 3-8.	1.55 MHz	Fully left	SW2–SW10, 2nd osc coil L310	Band Selector: SW2 Adjust for maximum meter reading.
		2.25 MHz	Fully left	SW2–SW10, 2nd osc trimmer CT307	
SW2–SW10 1st IF Tracking		1.7 MHz	Tune to 1.7 MHz signal	SW2–SW10, 1st i-f coil L302, L306	
		2.1 MHz	Tune to 2.1 MHz	SW2–SW10, 1st i-f trimmer CT302, CT303	
SW2 Frequency Coverage	To the SW2–SW10 ext. ant. terminal through a dummy ant. See Fig. 3-9. and Fig. 3-10.	4.65 MHz	Fully left	SW2 1st osc coil L207	Band Selector: SW2 Unsolder a violet lead shown in Fig. 3-10. Adjust for maximum meter reading.
SW2 Tracking		4.8 MHz	Tune to 4.8 MHz signal	SW2–SW4 ant coil L201 rf coil L204	
		5.2 MHz	Tune to 5.2 MHz signal	SW2 ant trimmer CT201 SW2 rf trimmer CT210	
SW3 Frequency Coverage	– ditto –	5.75 MHz	Fully left	SW3 1st osc coil L208	Band Selector: SW3 Adjust for maximum meter reading.
SW3 Tracking		6.3 MHz	Tune to 6.3 MHz	SW3 ant trimmer CT202 SW3 rf trimmer CT211	
SW4 Frequency Coverage	– ditto –	6.95 MHz	Fully left	SW4 1st osc coil L209	Band Selector: SW4 Adjust for maximum meter reading.
SW4 Tracking		7.5 MHz	Tune to 7.5 MHz	SW4 ant trimmer CT203 SW4 rf trimmer CT212	
SW5 Frequency Coverage	– ditto –	9.45 MHz	Fully left	SW5 1st osc coil L210	Band Selector: SW5 Adjust for maximum meter reading.
SW5 Tracking		9.6 MHz	Tune to 9.6 MHz signal	SW5–SW7 ant coil L202 rf coil L205	
		10.0 MHz	Tune to 10.0 MHz signal	SW5 ant trimmer CT204 SW5 rf trimmer CT213	
SW6 Frequency Coverage	– ditto –	11.55 MHz	Fully left	SW6 1st osc coil L211	Band Selector: SW6 Adjust for maximum meter reading.
SW6 Tracking		12.1 MHz	Tune to 12.1 MHz signal	SW6 ant trimmer CT205 SW6 rf trimmer CT214	

Adjustment	Rf Signal Generator Coupling	Rf Signal Generator Frequency	Receiver Dial Setting	Adjust	Remarks
SW7 Frequency Coverage	To the SW2~ SW10 ext. ant. terminal through a dummy ant. See Fig. 3-9 and Fig. 3-10.	14.95 MHz	Fully left	SW7 1st osc coil L212	Band Selector: SW7 Adjust for maximum meter reading.
SW7 Tracking		15.5 MHz	Tune to 15.5 MHz signal	SW7 ant trimmer CT206 SW7 rf trimmer CT215	
SW8 Frequency Coverage	– ditto –	17.45 MHz	Fully left	SW8 1st osc coil L213	Band Selector: SW8 Adjust for maximum meter reading.
SW8 Tracking	– ditto –	17.6 MHz	Tune to 17.6 MHz signal	SW8 – SW10 and coil L203 rf coil L206	
		18.0 MHz	Tune to 18.0 MHz signal	SW8 ant trimmer CT207 SW8 rf trimmer CT216	
SW9 Frequency Coverage	– ditto –	21.35 MHz	Fully left	SW9 1st osc coil L214	Band Selector: SW9 Adjust for maximum meter reading.
SW9 Tracking		21.9 MHz	Tune to 21.9 MHz	SW9 ant trimmer CT208 SW9 rf trimmer CT217	
SW10 Frequency Coverage	– ditto –	25.45 MHz	Fully left	SW10 1st osc coil L215	Band Selector: SW10 Adjust for maximum meter reading.
SW10 Tracking		26.0 MHz	Tune to 26.0 MHz	SW10 ant trimmer CT209 SW10 rf trimmer CT218	

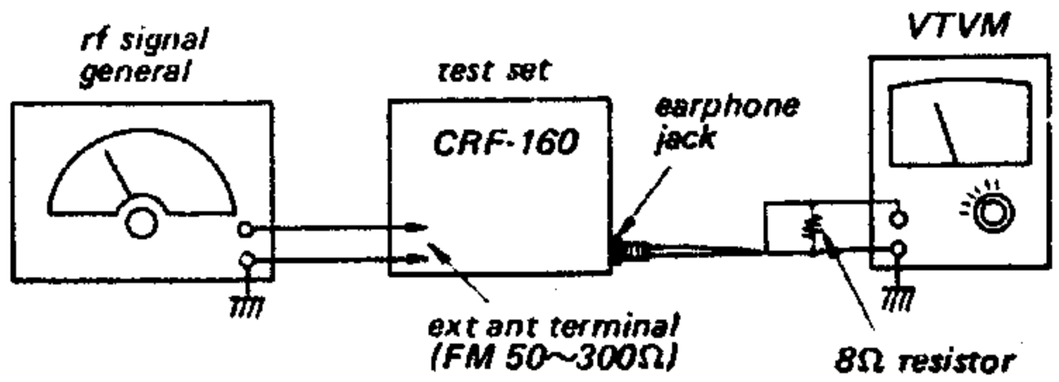

Fig. 3-4 FM frequency coverage and tracking adjustment setup

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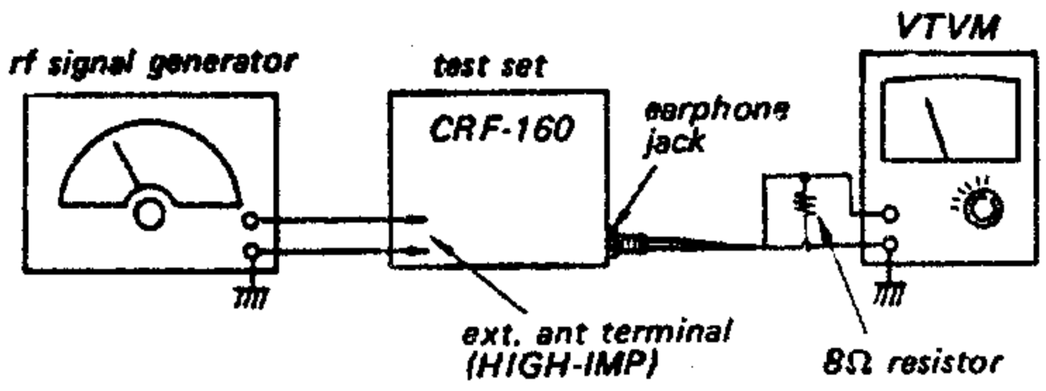

Fig. 3-5 SW1 frequency coverage and tracking adjustment setup

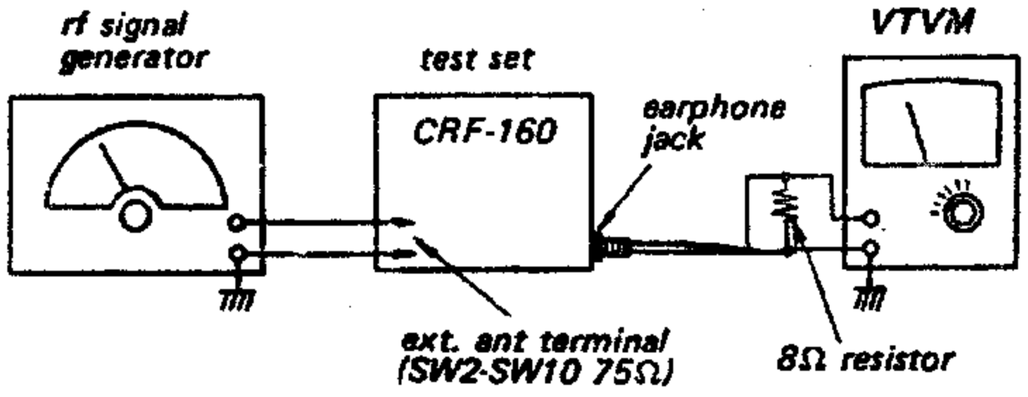

Fig. 3-9 SW2-SW10 frequency coverage and tracking adjustment setup

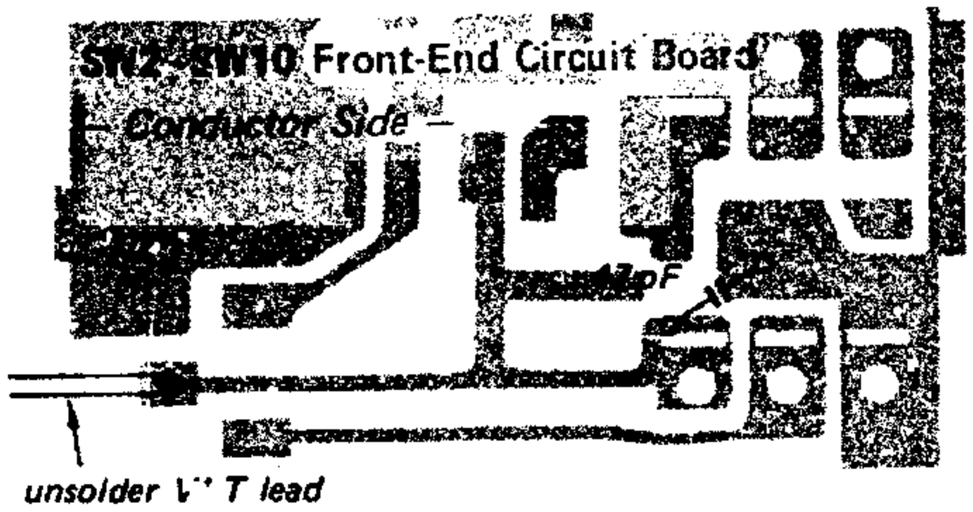

Fig. 3-10 Dummy antenna 47 pF

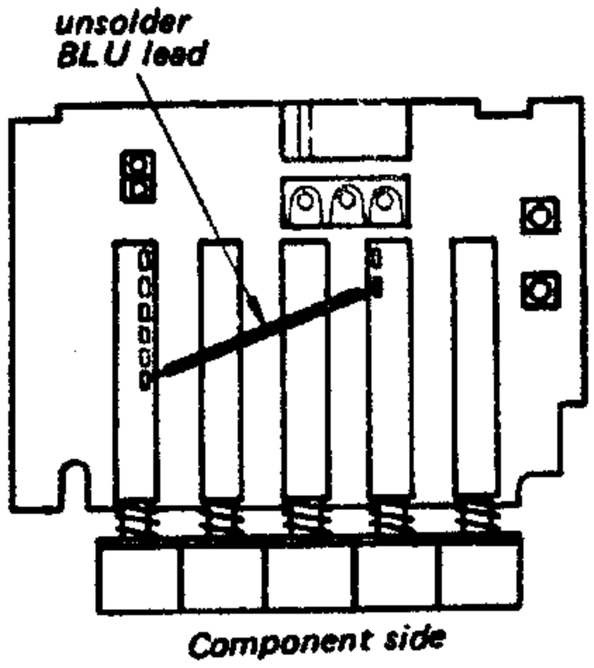

Fig. 3-6 Blue lead on cp circuit board

3-3. ADJUSTING PARTS LOCATIONS

Fig. 3-11 Fm front end block adjustments on fm front end block

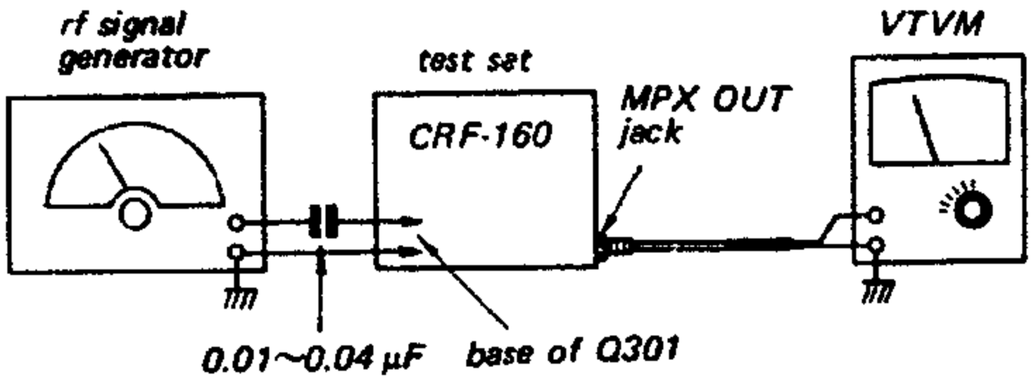

Fig. 3-7 SW2-SW10 1st i-f frequency coverage and tracking adjustment setup

Cp/I-f Circuit Board

Fig. 3-8 Signal generator connection

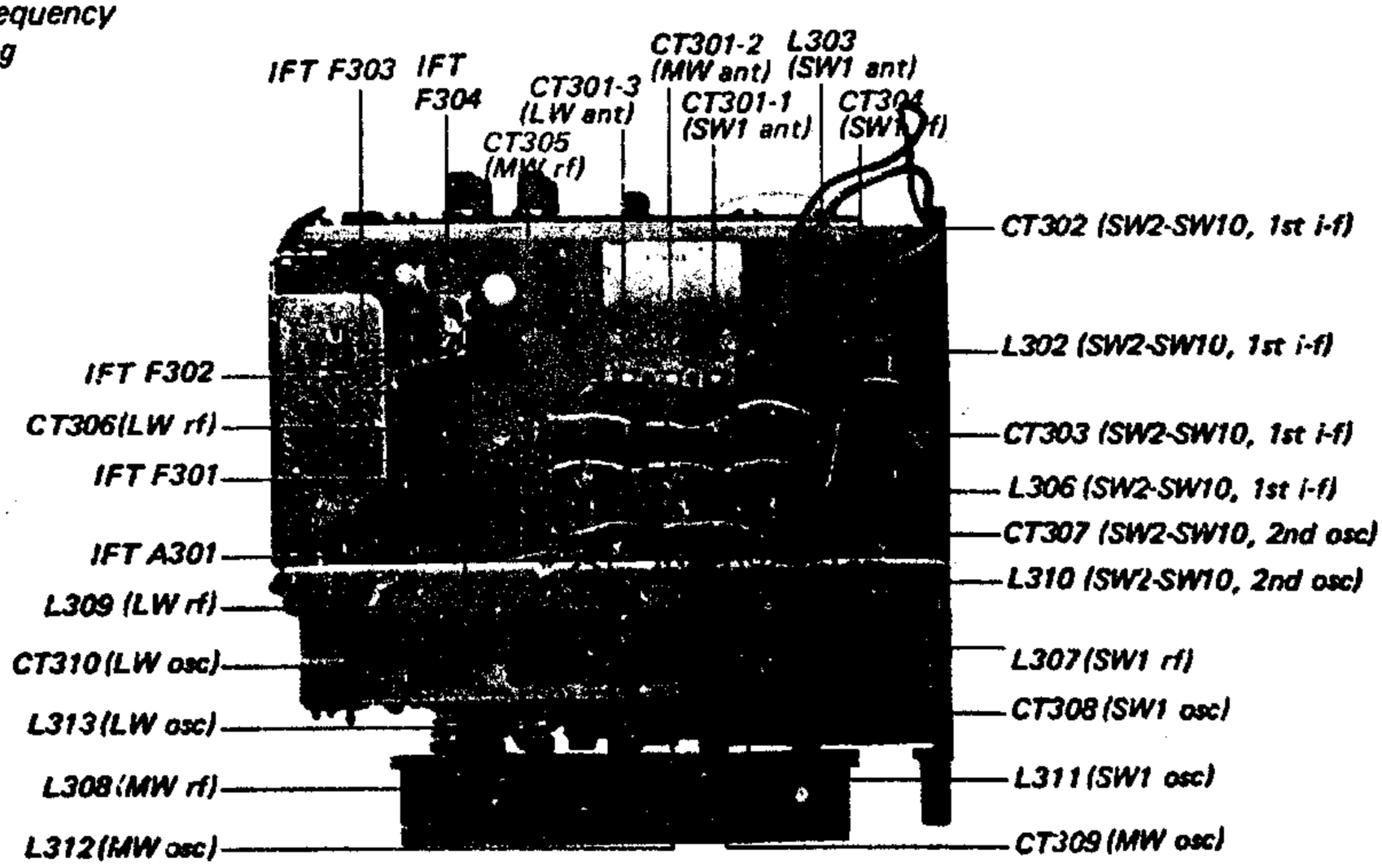

Fig. 3-12 Cp/i-f circuit board adjustments

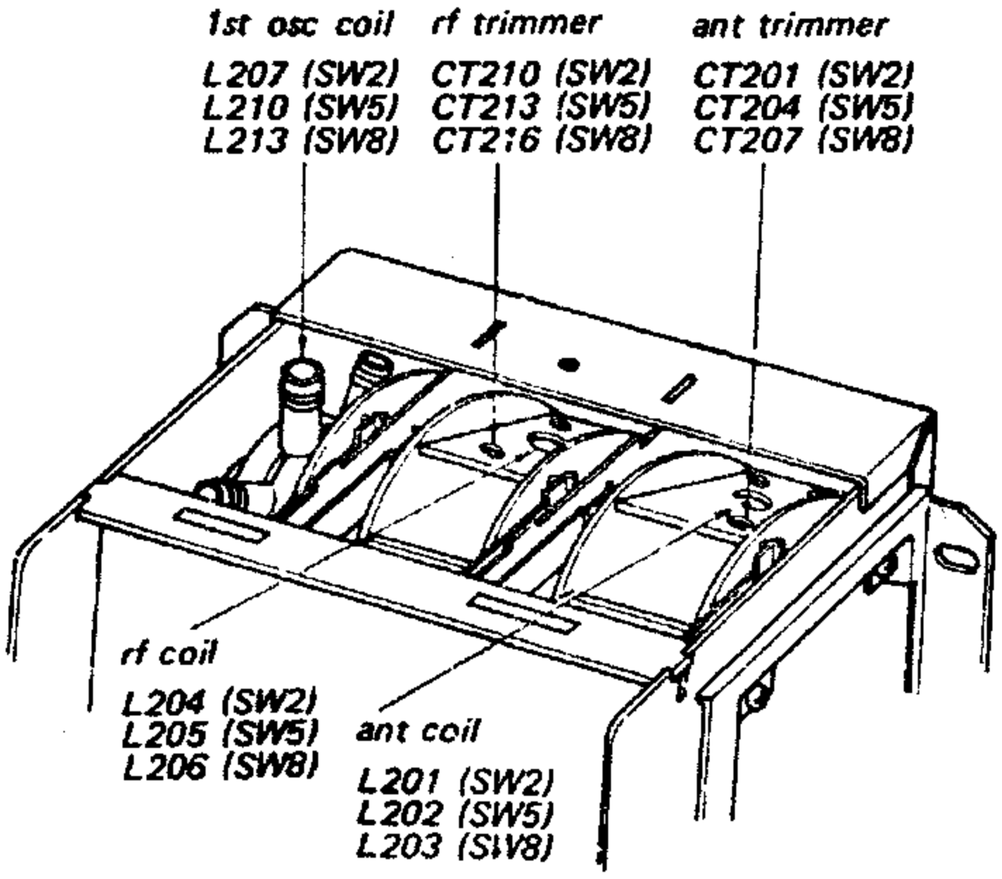

Fig. 3-13 Adjusting parts for SW2, SW5, SW8

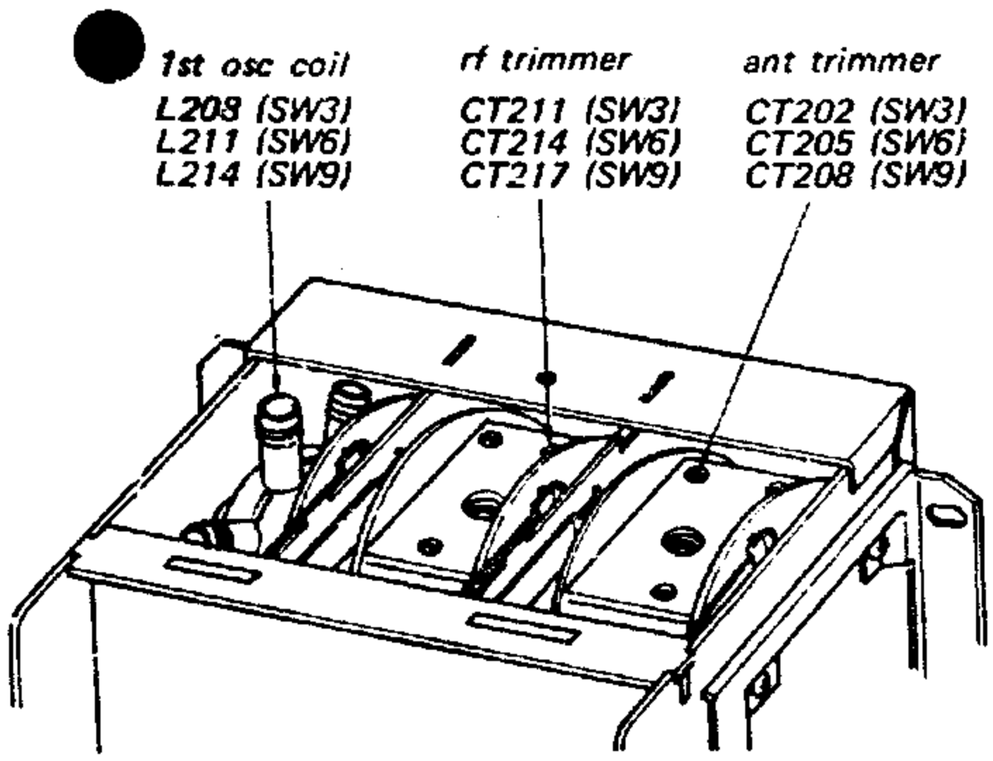

Fig. 3-14 Adjusting parts for SW3, SW6, SW9

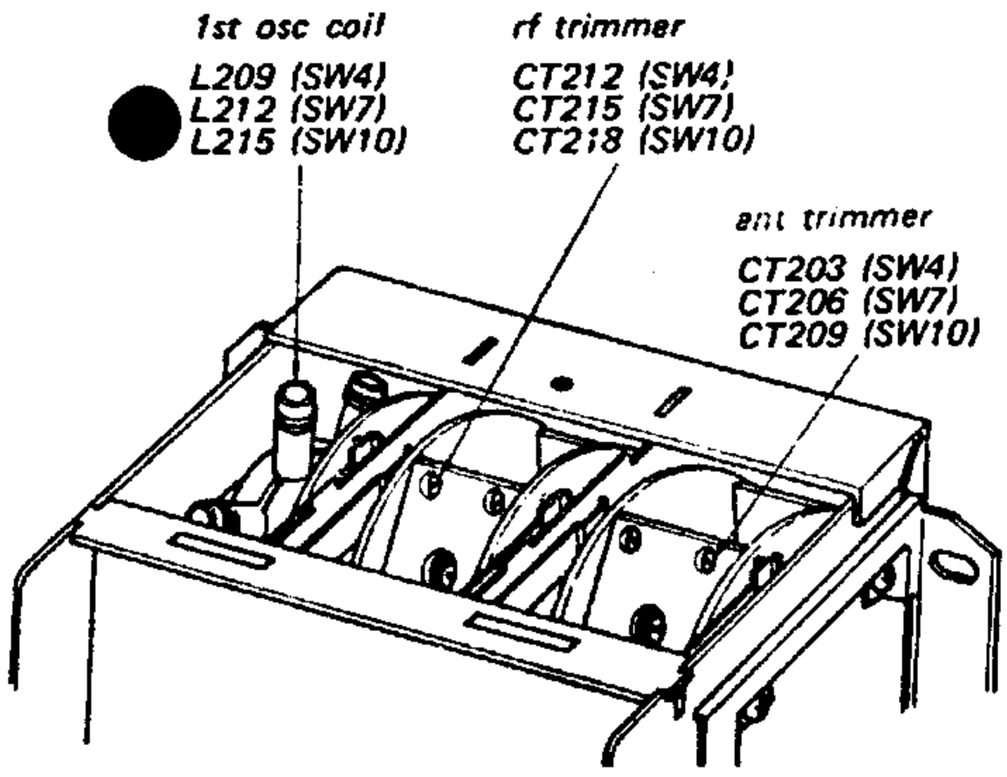

Fig. 3-15 Adjusting parts for SW4, SW7, SW10

3-4. VOLTAGE AND CURRENT ADJUSTMENT

1. Regulator Voltage

Parts to be selected: R371
Band selector: MW
Power requirement: ac
Adjustment: R371 must be selected to obtain 4.5V at emitter of Q309.

R371: ¼W carbon resistor

1-240-466	510Ω
1-240-467	560Ω
1-240-468	620Ω
1-240-469	680Ω
1-240-470	750Ω

2. A-m I-f Current

Parts to be selected: R338
Band selector: MW
Power requirement: ac
Adjustment: R338 must be selected to obtain 0.27V at emitter of Q306.

R338: ¼W carbon resistor

1-240-520	91 kΩ
1-240-521	100 kΩ
1-240-522	110 kΩ
1-240-523	120 kΩ
1-240-524	130 kΩ
1-240-525	150 kΩ

3. Tuning Meter Calibration (For A-m Tuning)

Parts to be selected: R342
Band selector: MW
Power requirement: ac
Adjustment: R342 must be selected so that the pointer of the tuning meter shows between 0 and 1.5 when no radio signal is received.

R342: ¼W carbon resistor

1-240-473	1 kΩ
1-240-475	1.2 kΩ
1-240-479	1.8 kΩ
1-240-480	2 kΩ

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4. Tuning Meter Calibration (For Fm Tuning)

Parts to be selected: R343
Band selector: FM
Power requirement: ac
Adjustment: R343 must be selected so that the pointer of the tuning meter shows between 0 and 1.5 when no radio signal is received.

R343:	¼W carbon resistor	
	1-240-470	750Ω
	1-240-471	820Ω
	1-240-472	910Ω
	1-240-473	1 kΩ
	1-240-475	1.2 kΩ

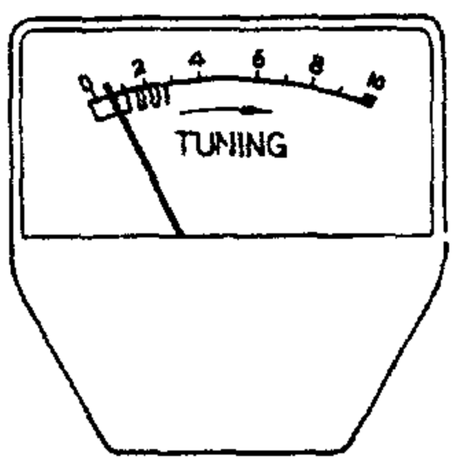


Fig. 3-16 Tuning meter

3-5. BFO ADJUSTMENT

Test Equipments/Tools Required:
* Rf signal generator
* Loop antenna
* Screwdriver for alignment

Preparation:
Setup: See Fig. 3-17.
Rf signal: 455 kHz unmodulated signal
Band selector: MW
BFO PITCH control knob:
mechanical mid position
RF GAIN control knob:
mechanical mid position

Adjustment:
Adjust L01 to obtain zero beat.

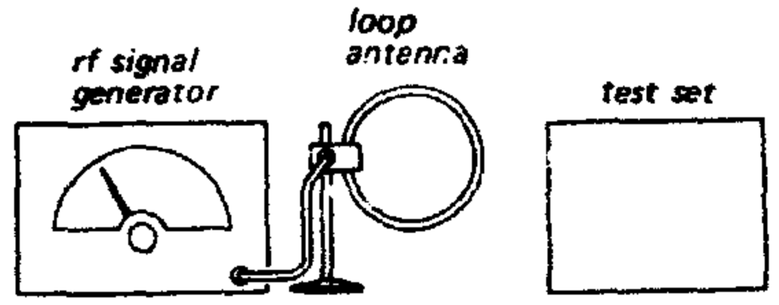


Fig. 3-17 BFO adjustment setup

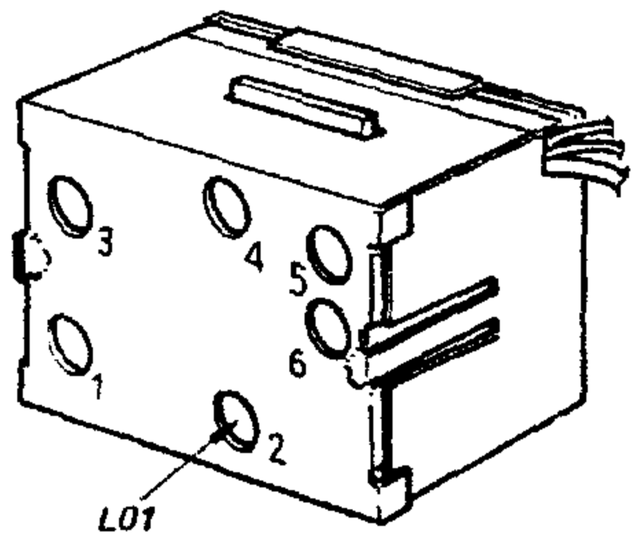
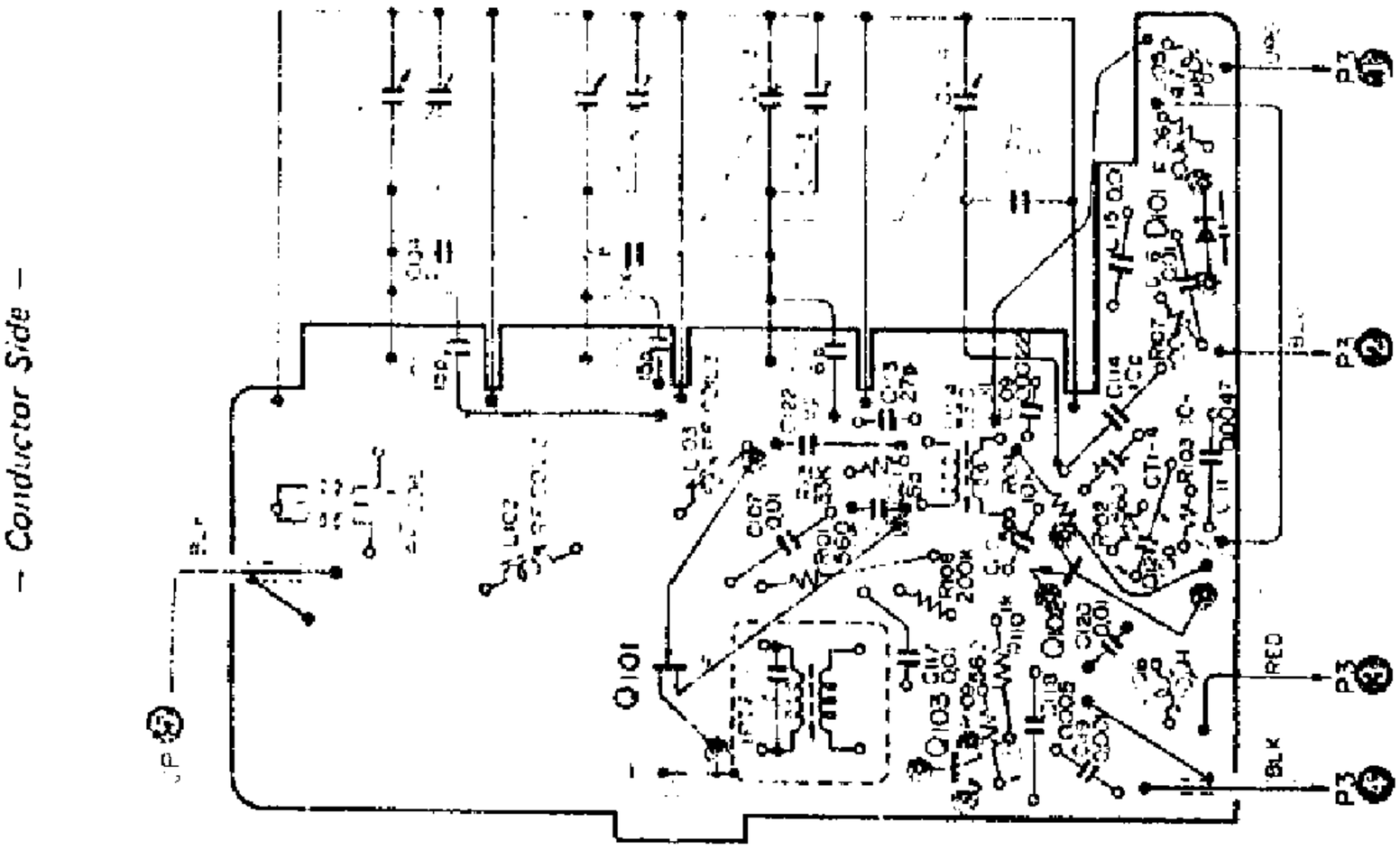


Fig. 3-18 Adjusting parts location

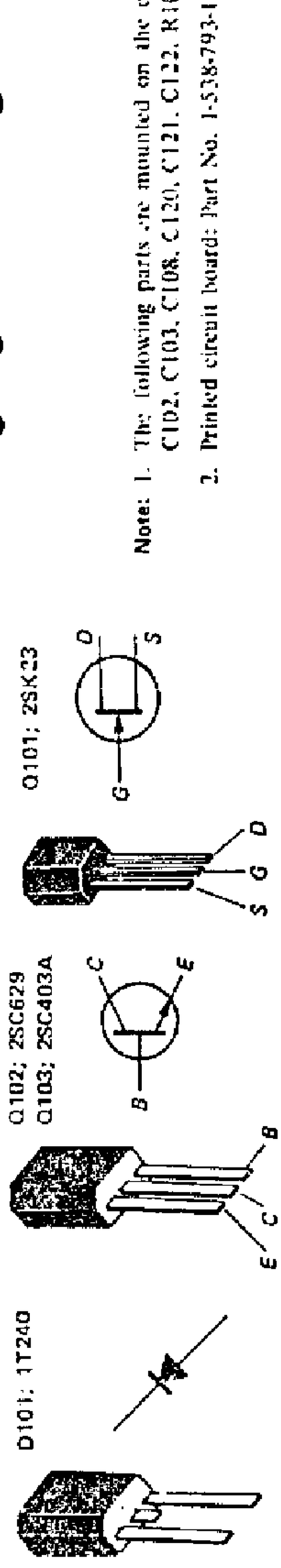
SECTION 4
MOUNTING AND SCHEMATIC DIAGRAMS

4-1. FM FRONT END CIRCUIT BOARD (P1)



Note: 1. The following parts are mounted on the conductor side: C101, C102, C103, C108, C120, C121, C122, R104 and Q101.

2. Printed circuit board: Part No. 1-538-793-12



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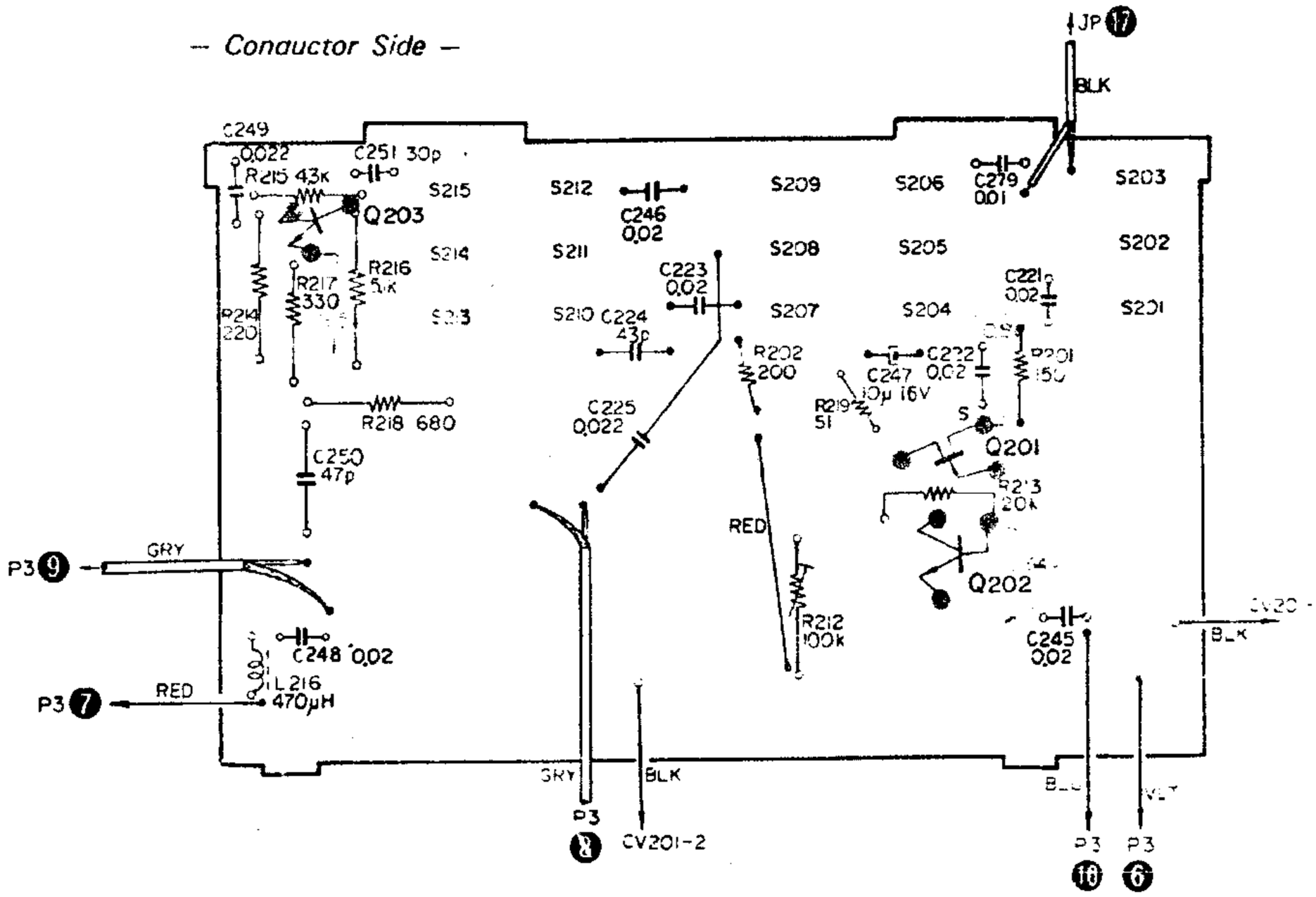
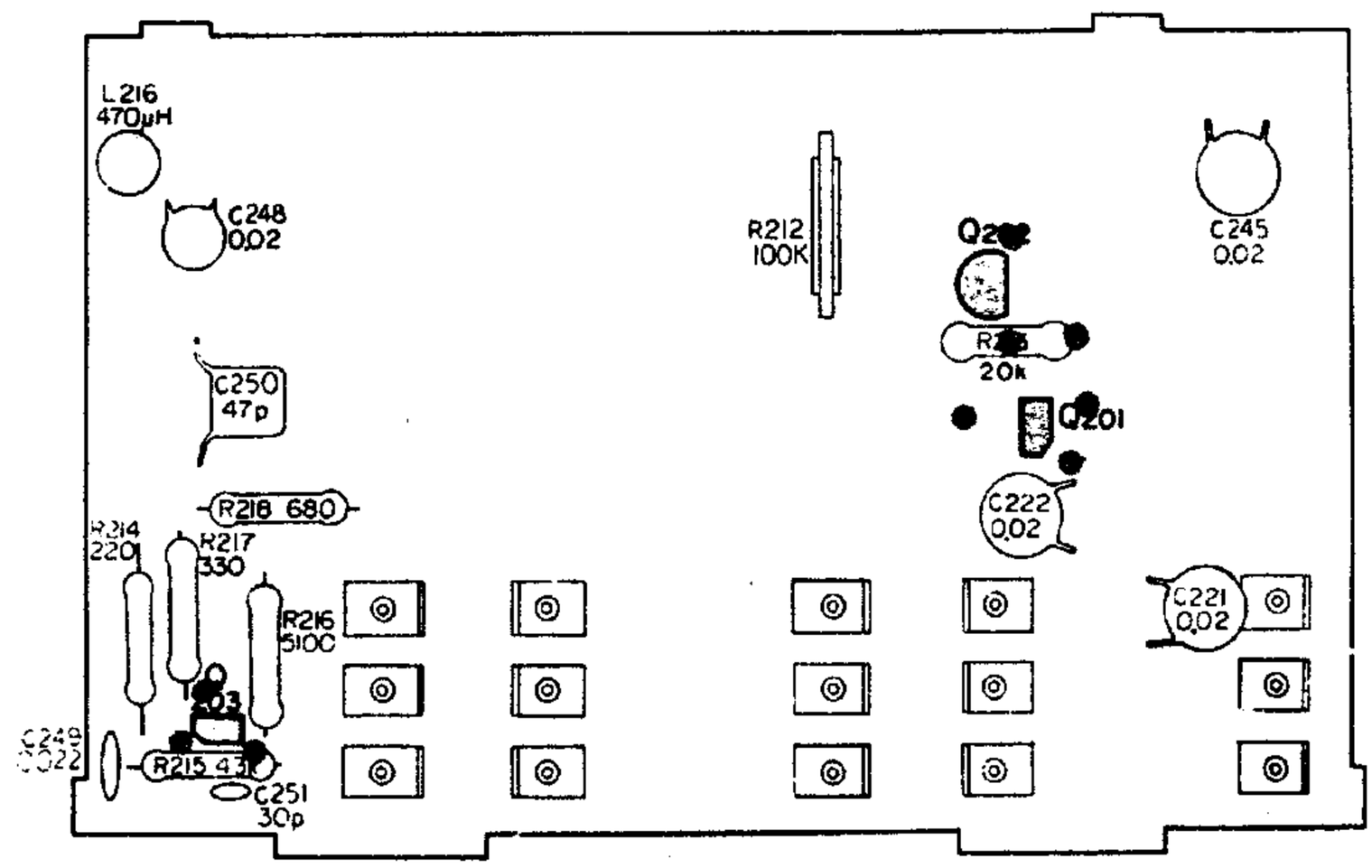
4-2. SW2–SW10 FRONT END (P2)

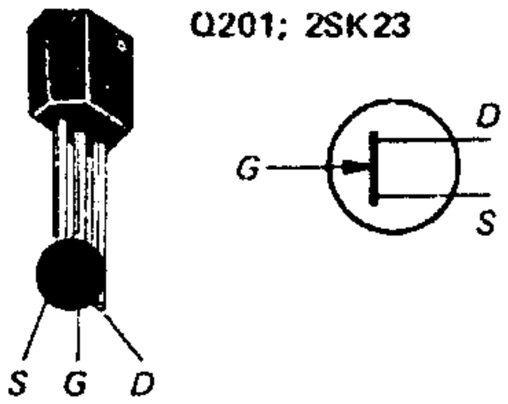
– Conductor Side –



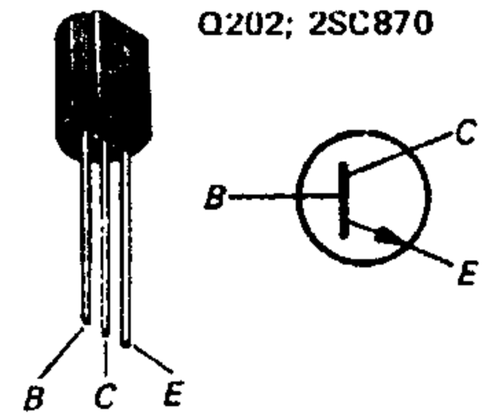
– Component Side –



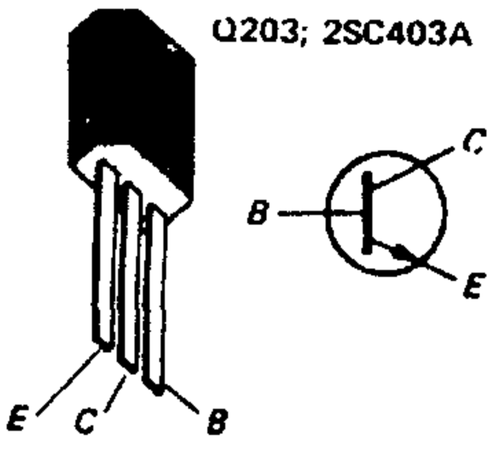
Q201; 2SK23



Q202; 2SC870



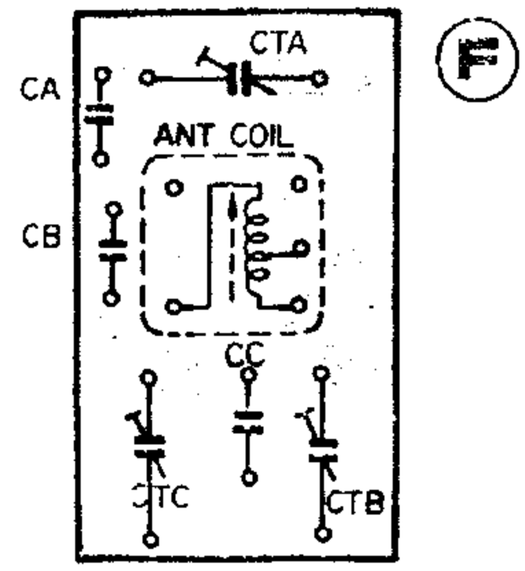
Q203; 2SC403A

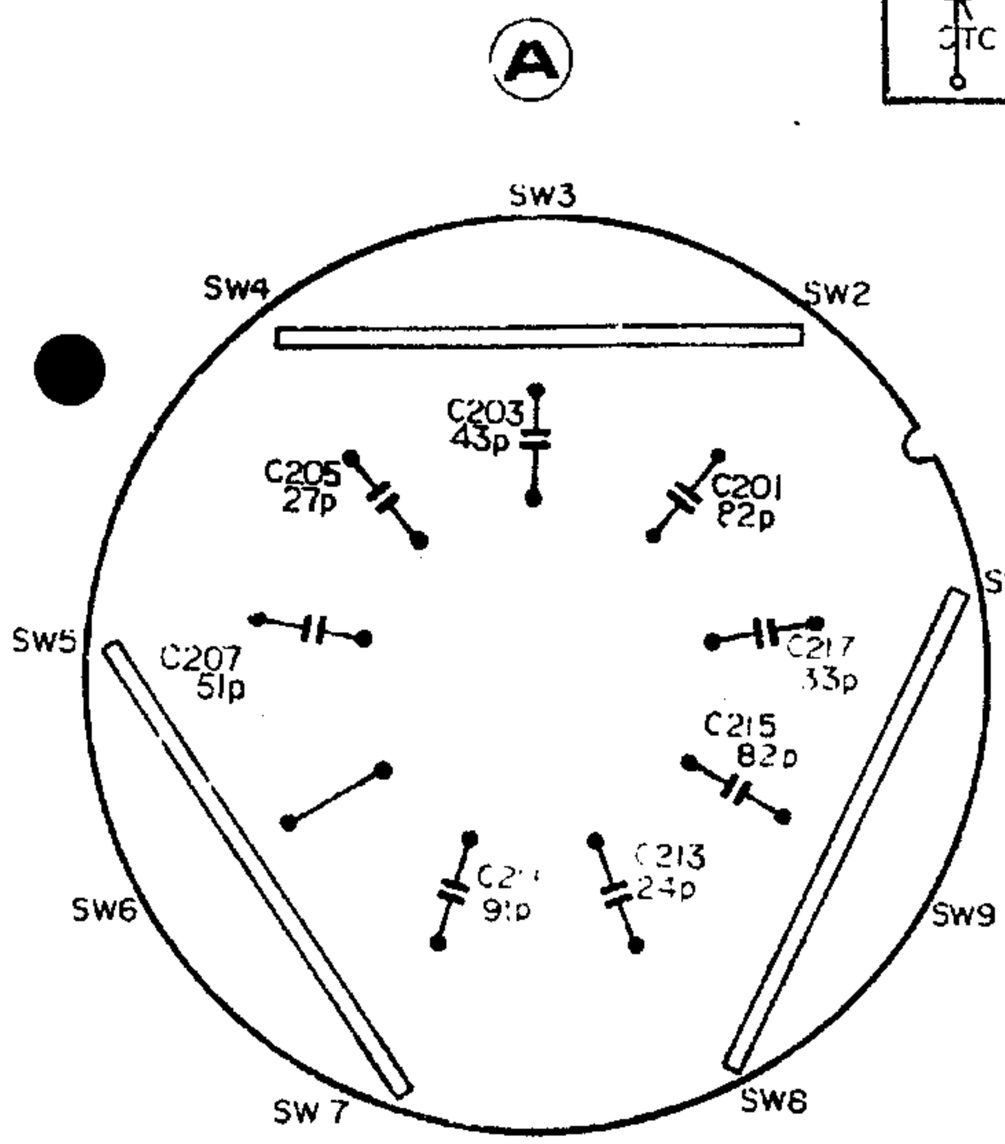


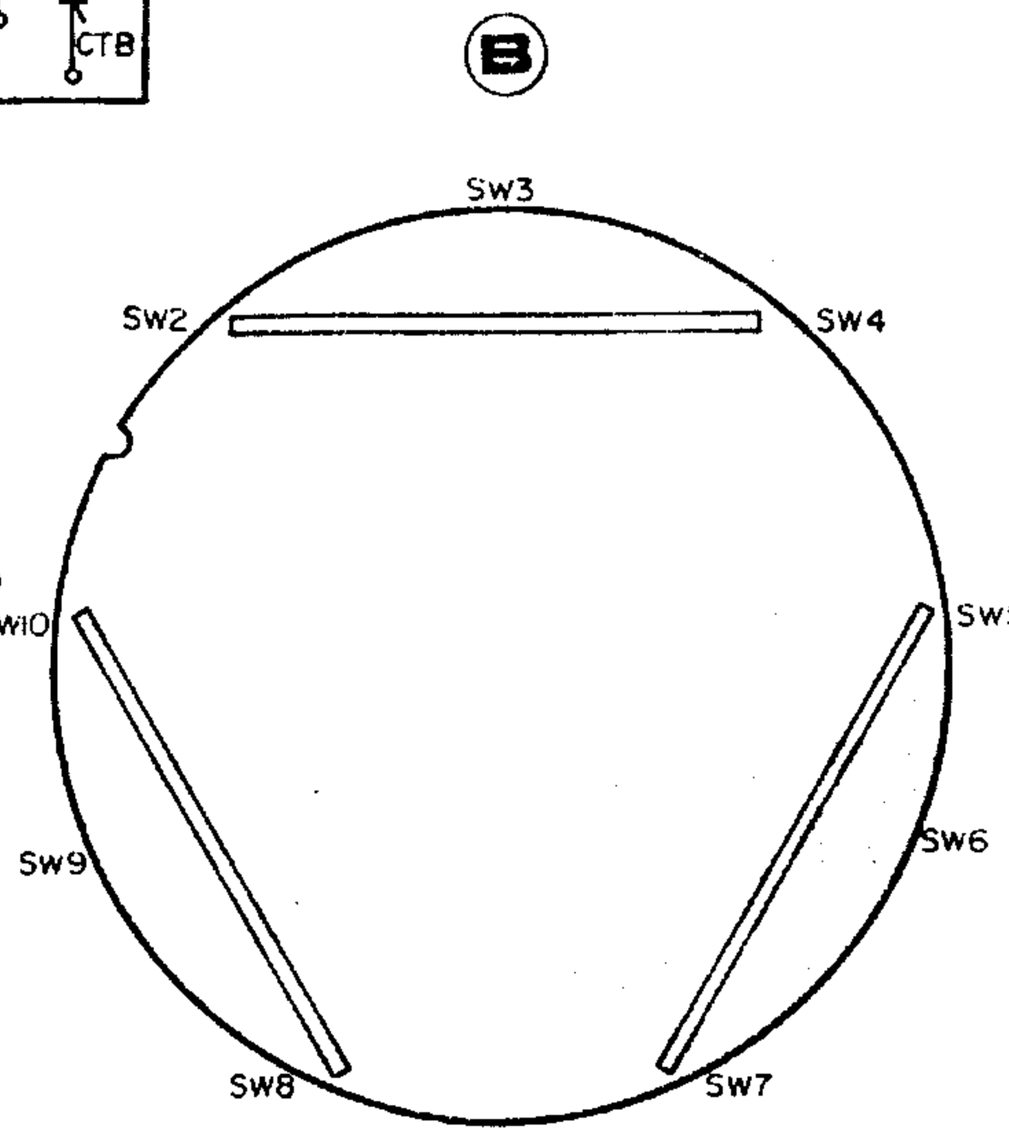
Note:

1. The following parts are mounted on the conductor side; R201, R202, C223, C224, C246, Q201, Q202, and Q203.
2. Printed circuit board;
   Part No. 1-539-244-11

C201, C203, C205, C207, C211, C213, C215, C217 mounted on the conductor side.







Parts Description on Circuit Board (F)

BAND	ANT COIL	CAPACITOR			TRIMMER CAPACITOR		
		CA	CB	CC	CTA	CTB	CTC
SW2 ~ SW4	L201	C202	C204	C206	CT201	CT202	CT203
		100pF	36pF	8pF			
SW5 ~ SW7	L202	C208	C210	C212	CT204	CT205	CT206
		180pF	39pF	13pF			
SW8 ~ SW10	L203	C214	C216	C218	CT207	CT208	CT209
		16pF	9pF	10pF			

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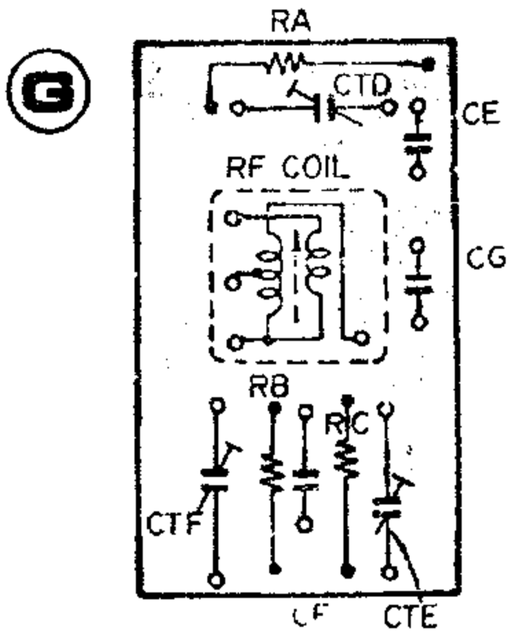
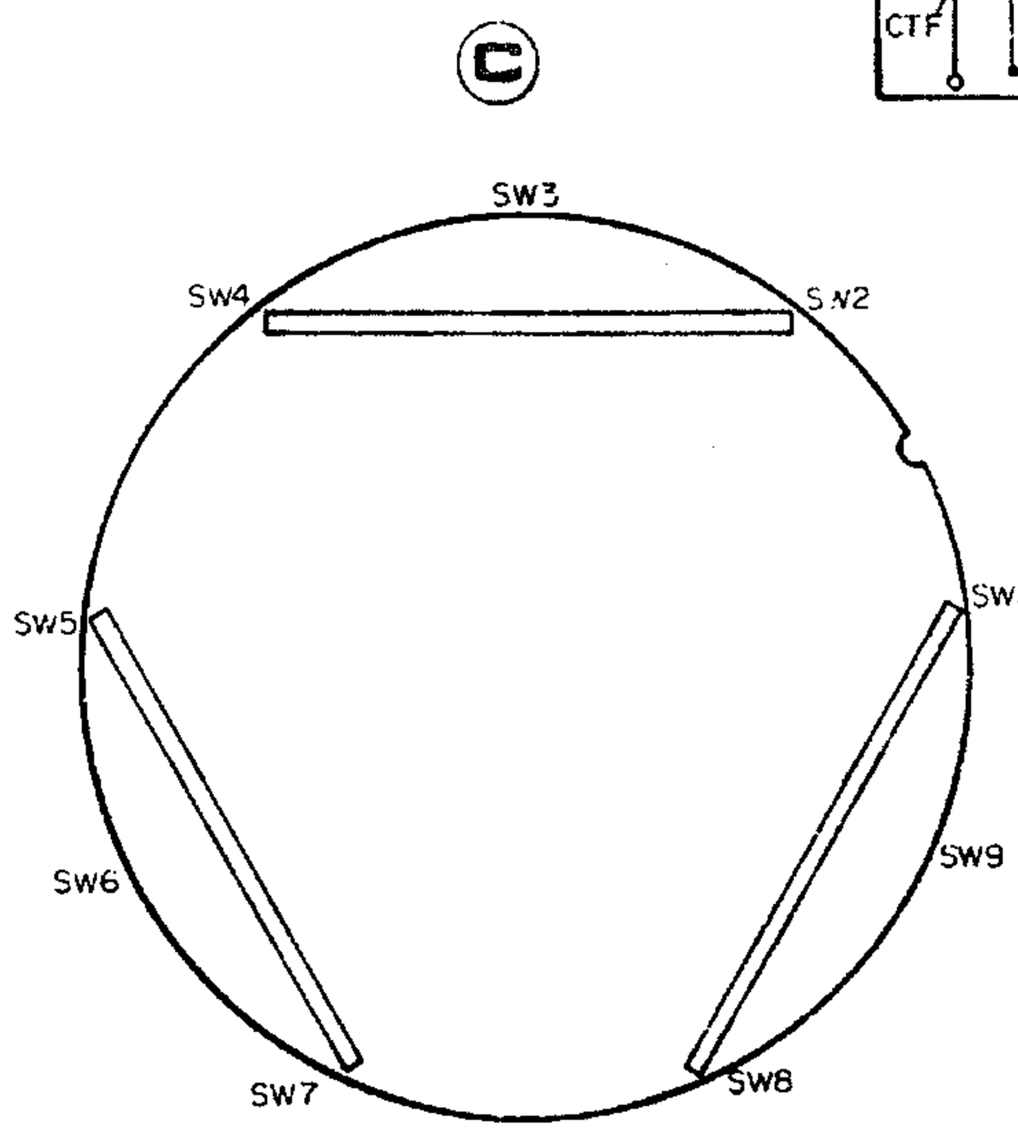
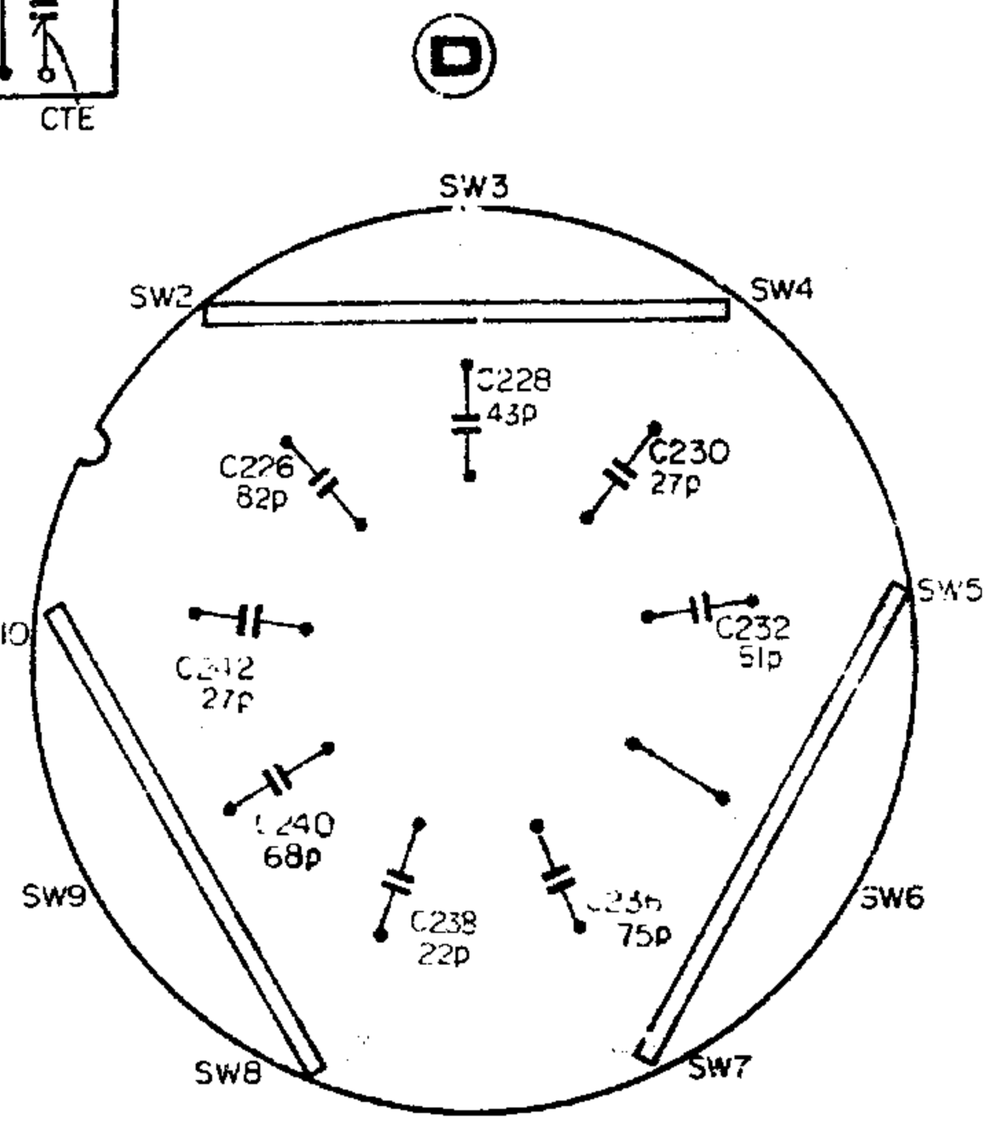


C226, C228, C230, C232, C236, C238, C240, C242; mounted on the conductor side.



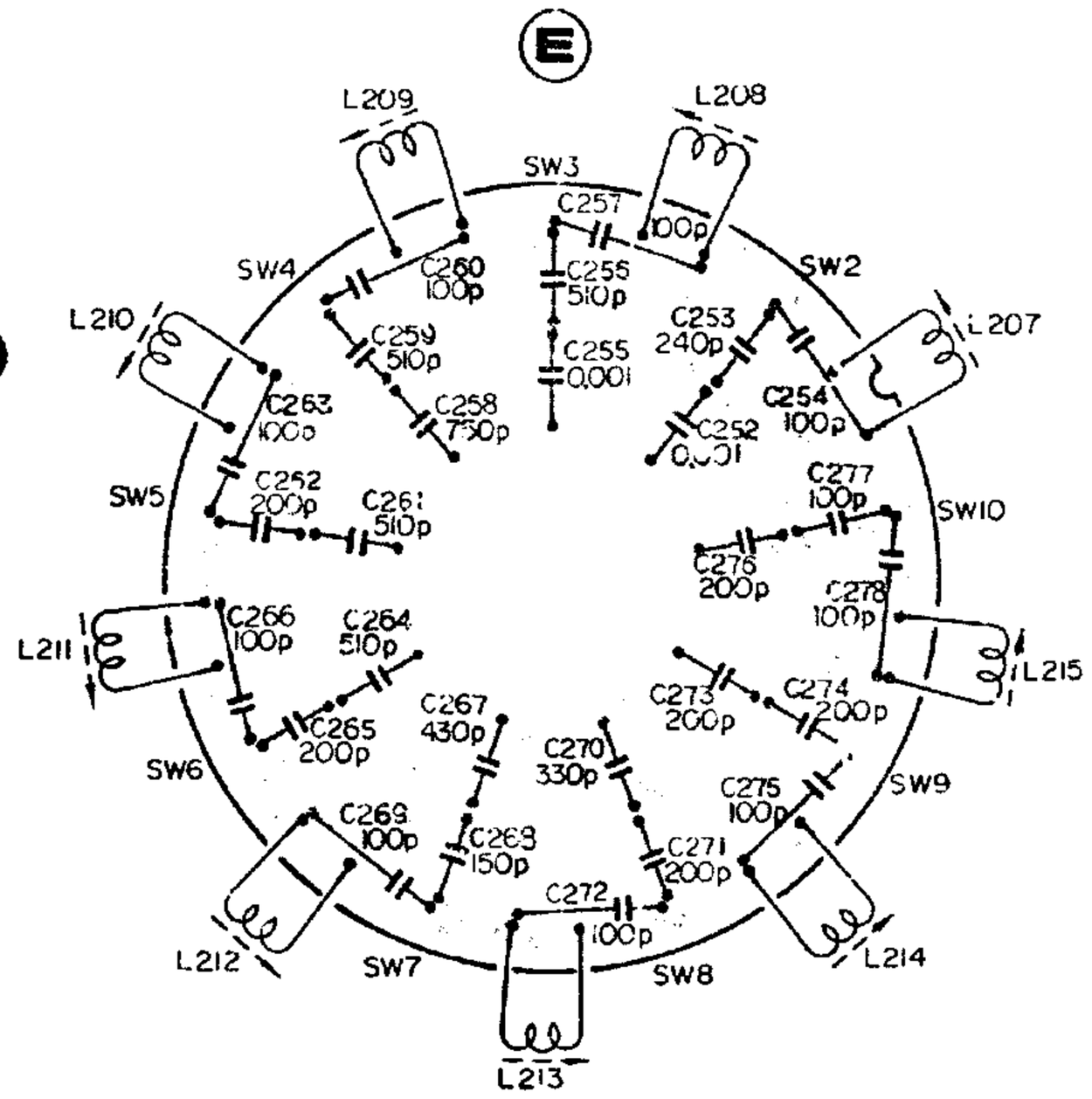


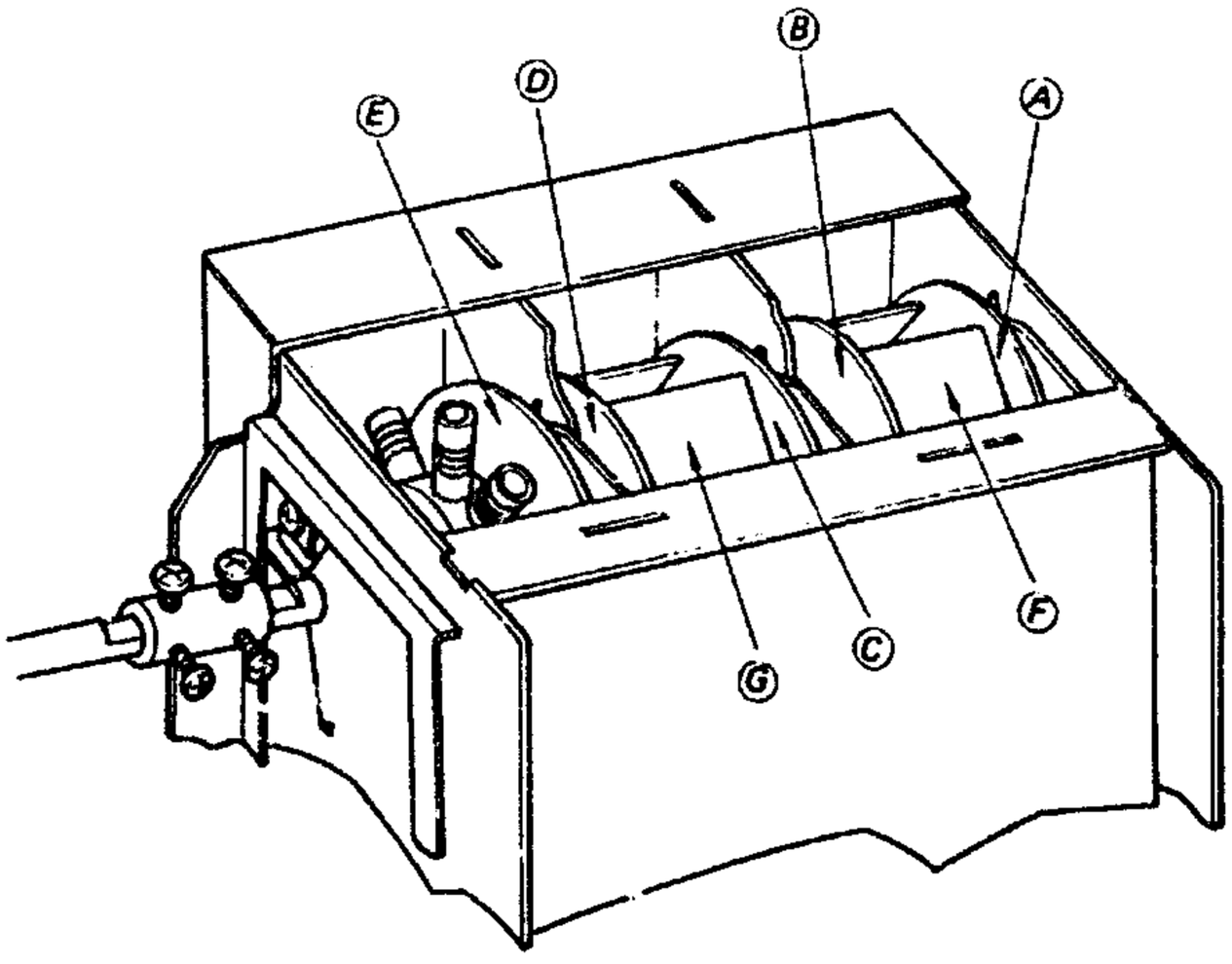
Parts Description on Circuit Board (G)

BAND	RF COIL	CAPACITOR			RESISTOR			TRIMMER CAPACITOR		
		CE	CF	CG	RA	RB	RC	CTD	CTE	CTF
SW2–SW4	L204	C227	C229		R203	R204	R205	CT 210	CT 211	CT 212
		82pF	33pF		3k	2k	1.5k			
SW5–SW7	L205	C233	C235	C237	R206	R207	R208	CT 213	CT 214	CT 215
		150pF	39pF	13pF	4.3k	1.8k	820			
SW8–SW10	L206	C239	C241	C243	R209	R210	R211	CT 216	CT 217	CT 218
		16pF	9pF	10pF	2.7k	2k	1.5k			

RA, RB, RC ; mounted on the conductor side.

C252–C277, L07–L15; mounted on the conductor side.





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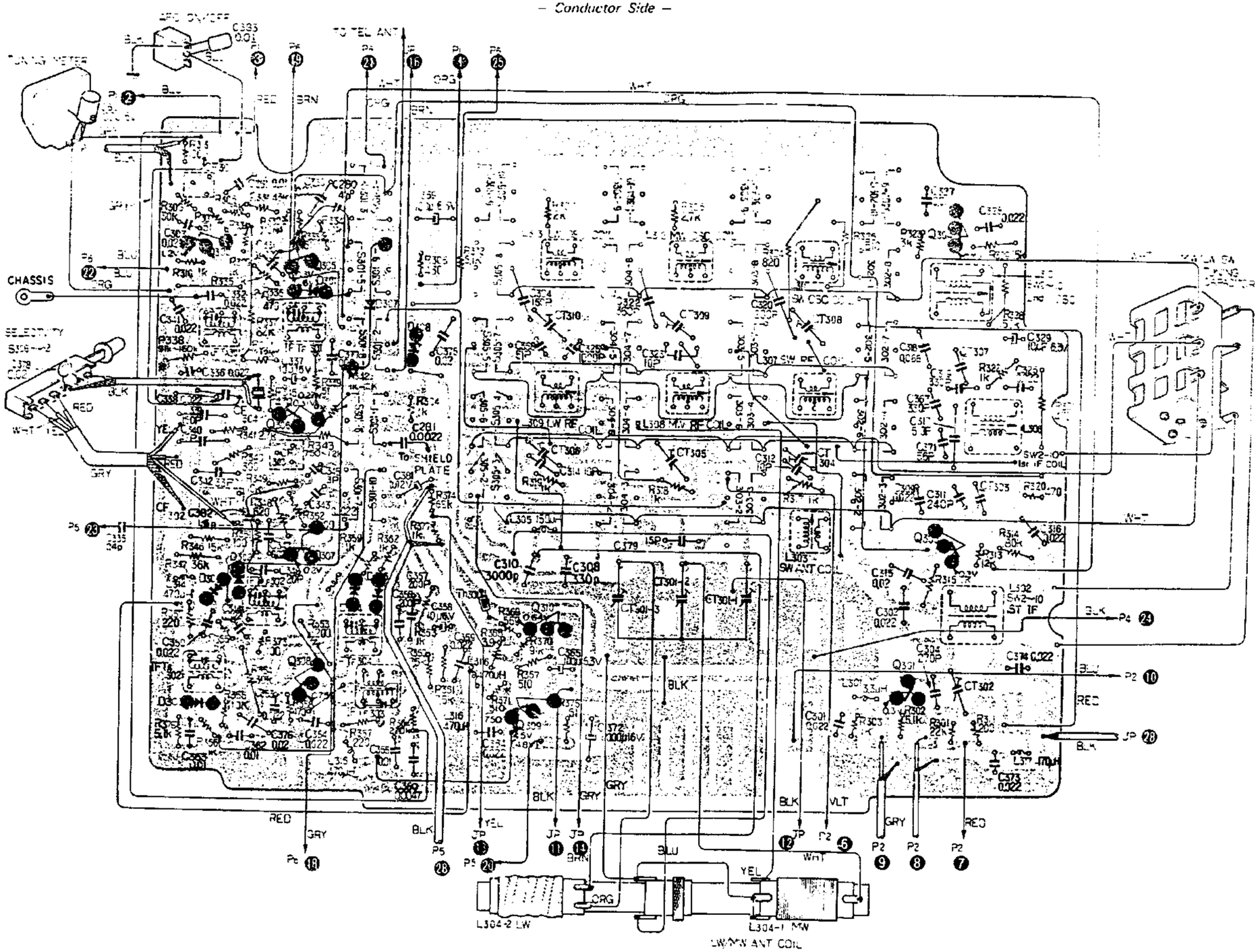
4-3. CP/IF CIRCUIT BOARD (P3)

– Conductor Side –



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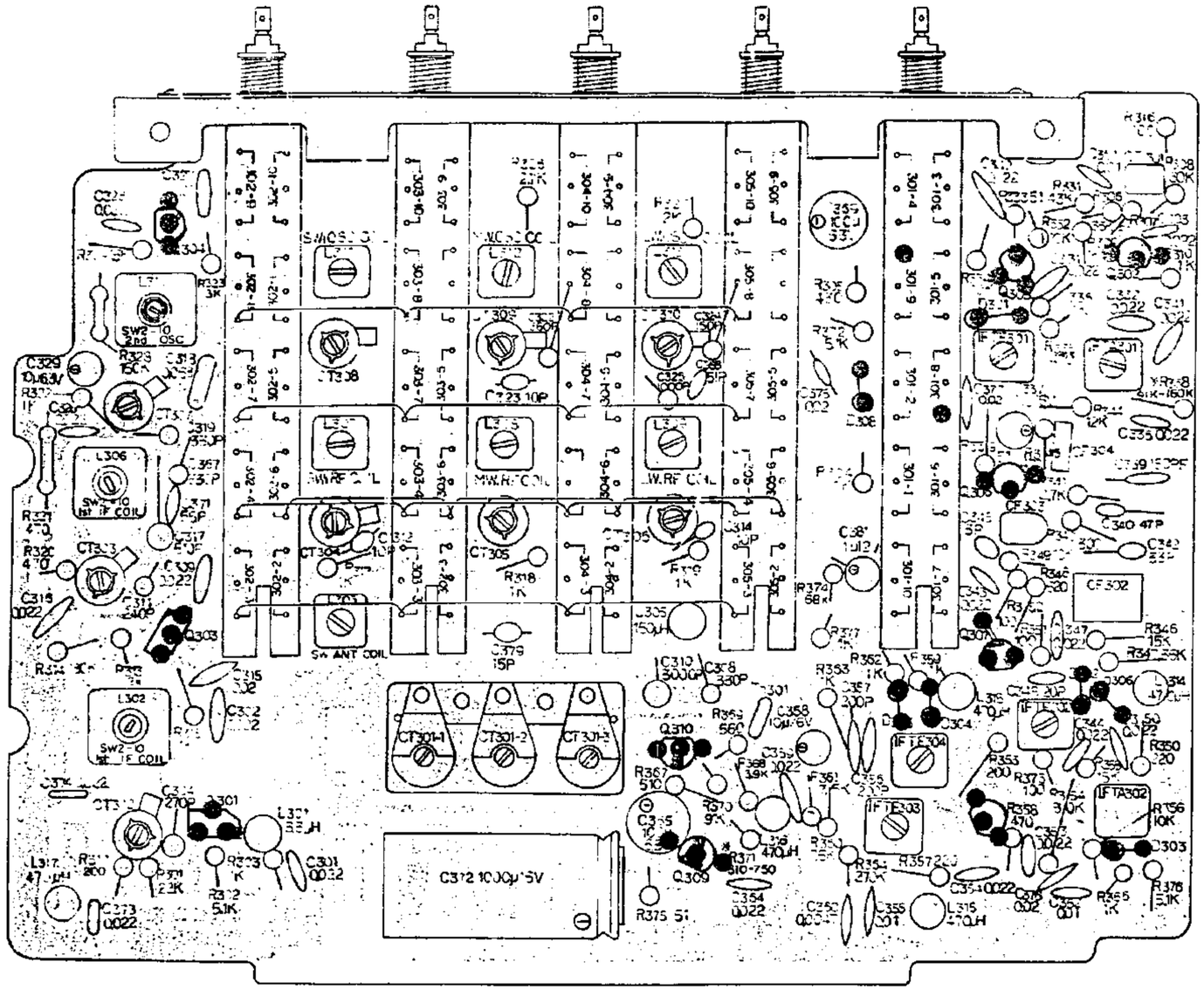
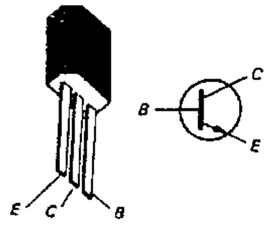
– Component Side –



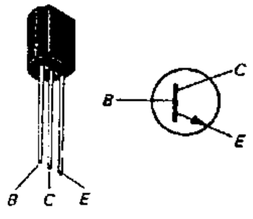
Note:

1. The following parts are mounted on the conductor side: R317, R318, R319, R325, R337, R342, R343, C280, C281, C306, C319, C345, C347, C361, C363, C369, C371, C376, C377, C379, C382, L318, D307.
2. Printed circuit board: Part No. 1-539-252-12

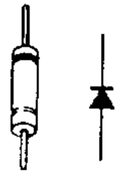
Q301, Q303; 2SC403A



Q302, Q304 – Q308; 2SC710
Q309, Q310; 2SC870

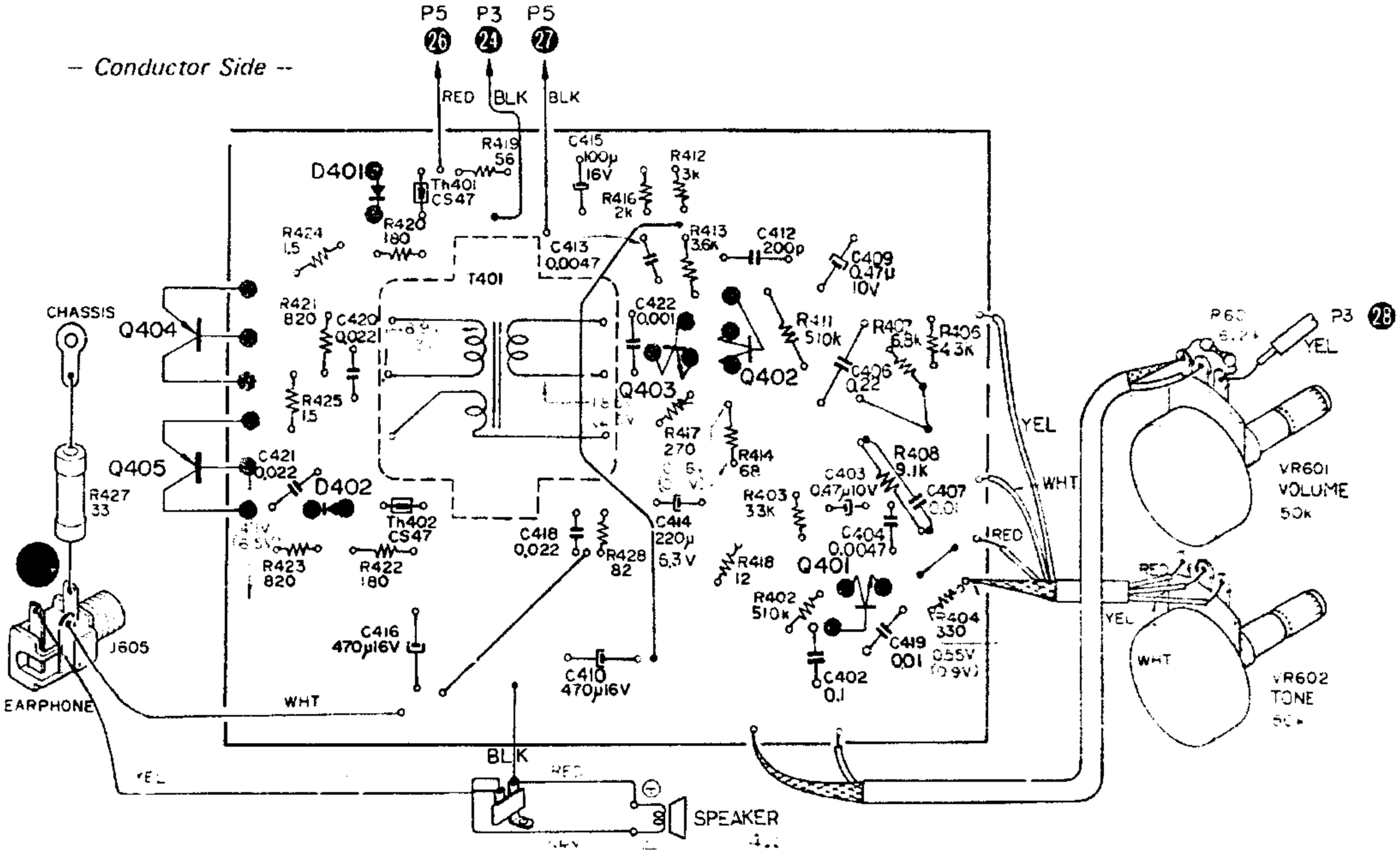


D301, D302, D304, D305; 1T262
D303; 1T23
D306; 1T261

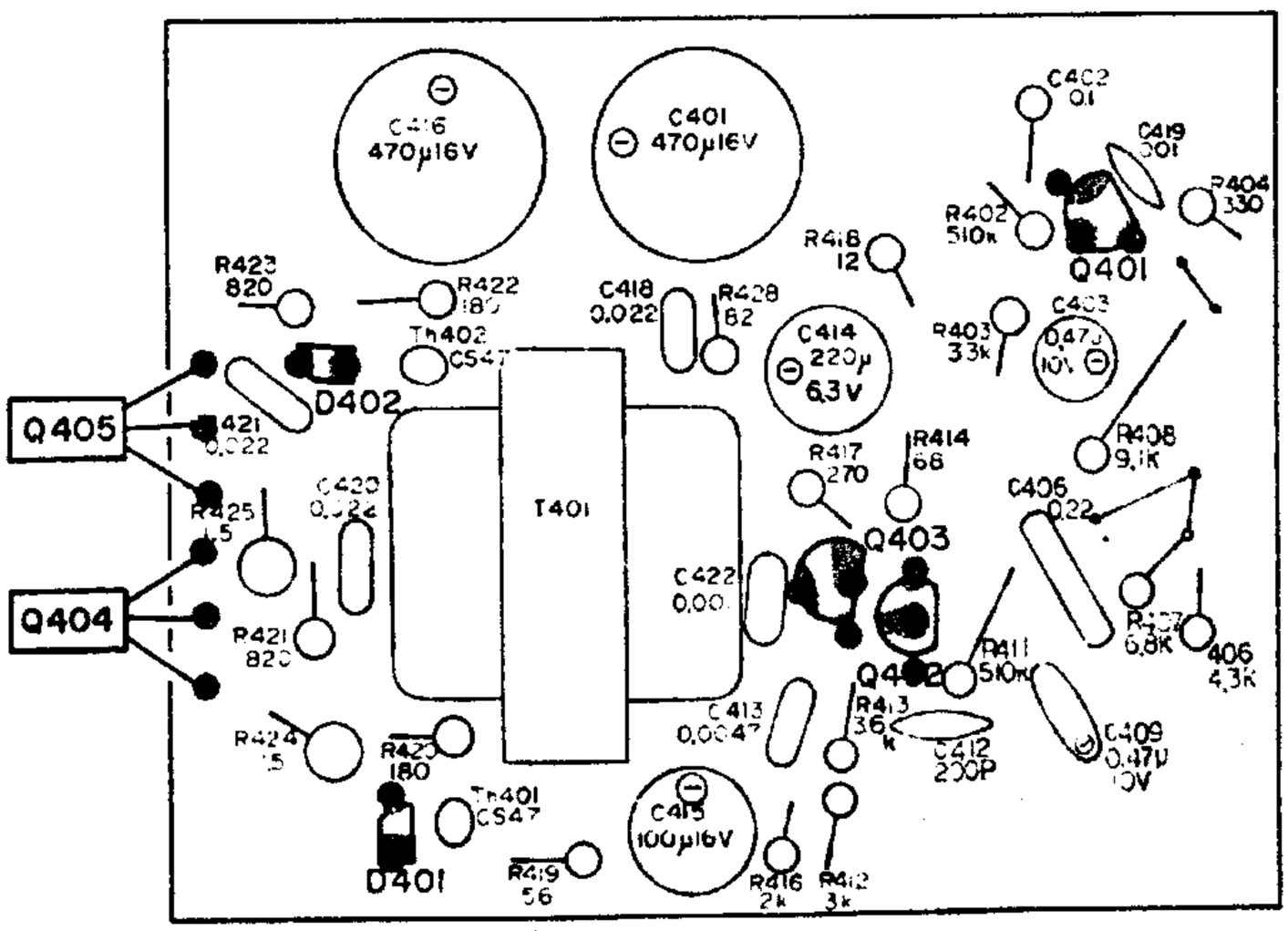


4-4. AF CIRCUIT BOARD (P4)

– Conductor Side –



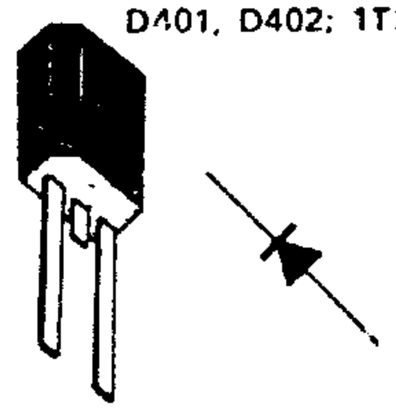
– Component Side –



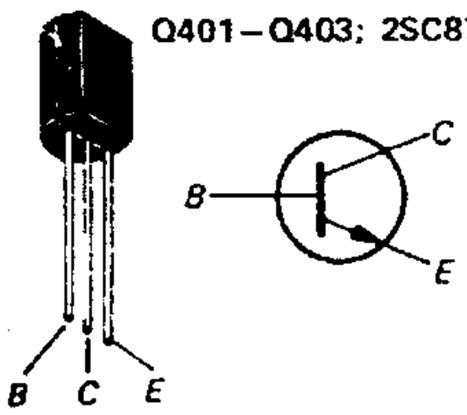
Note:

1. The following parts are mounted on the conductor side: C419, C420, C421, C422.
2. Printed circuit board: Part No. 1-539-253-12

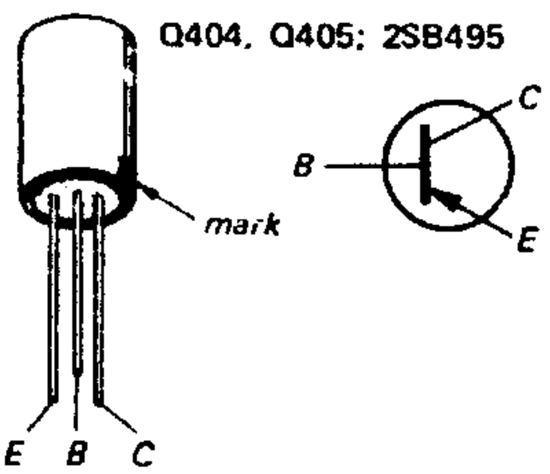
D401, D402: 1T243



Q401 – Q403: 2SC870



Q404, Q405: 2SB495



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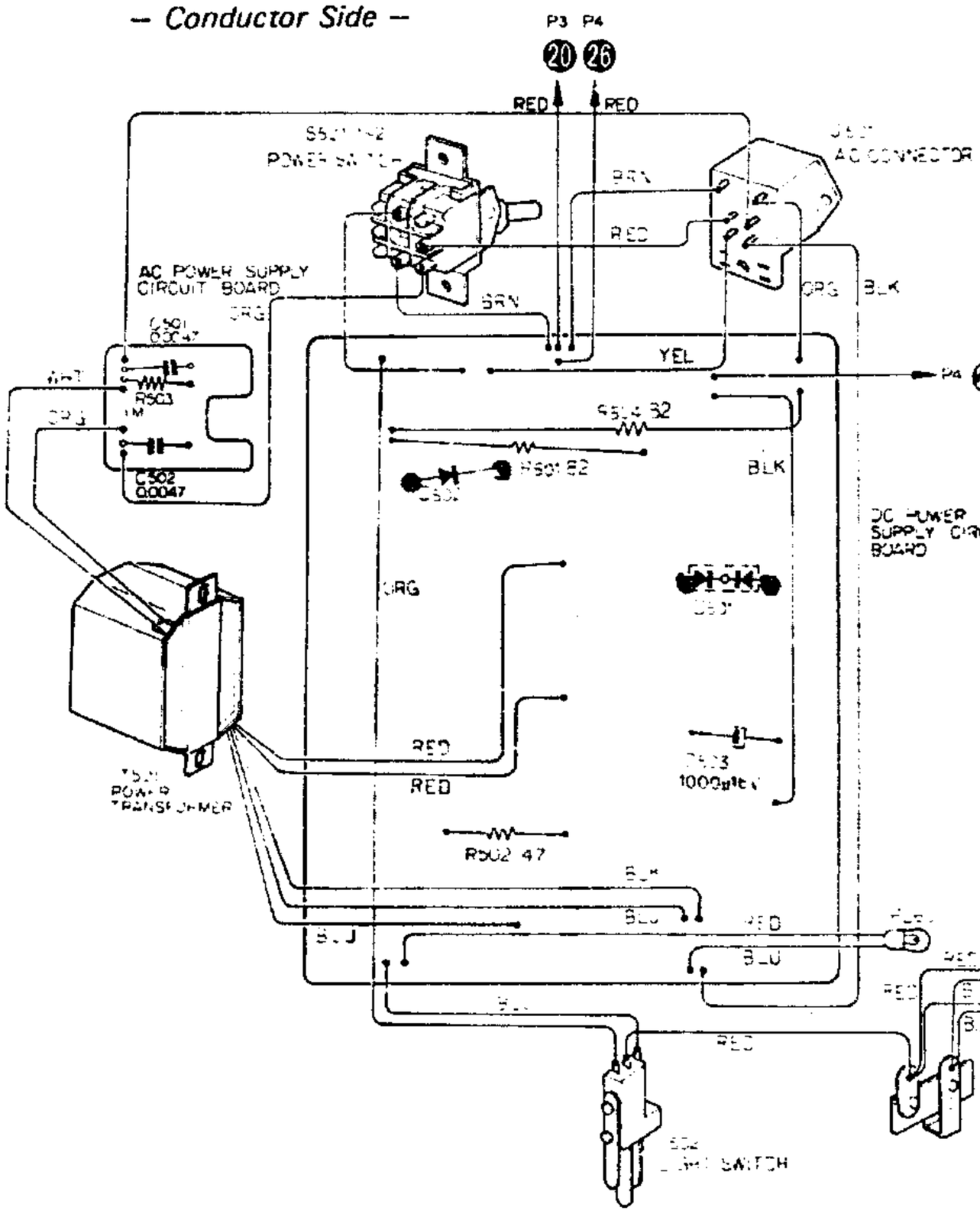
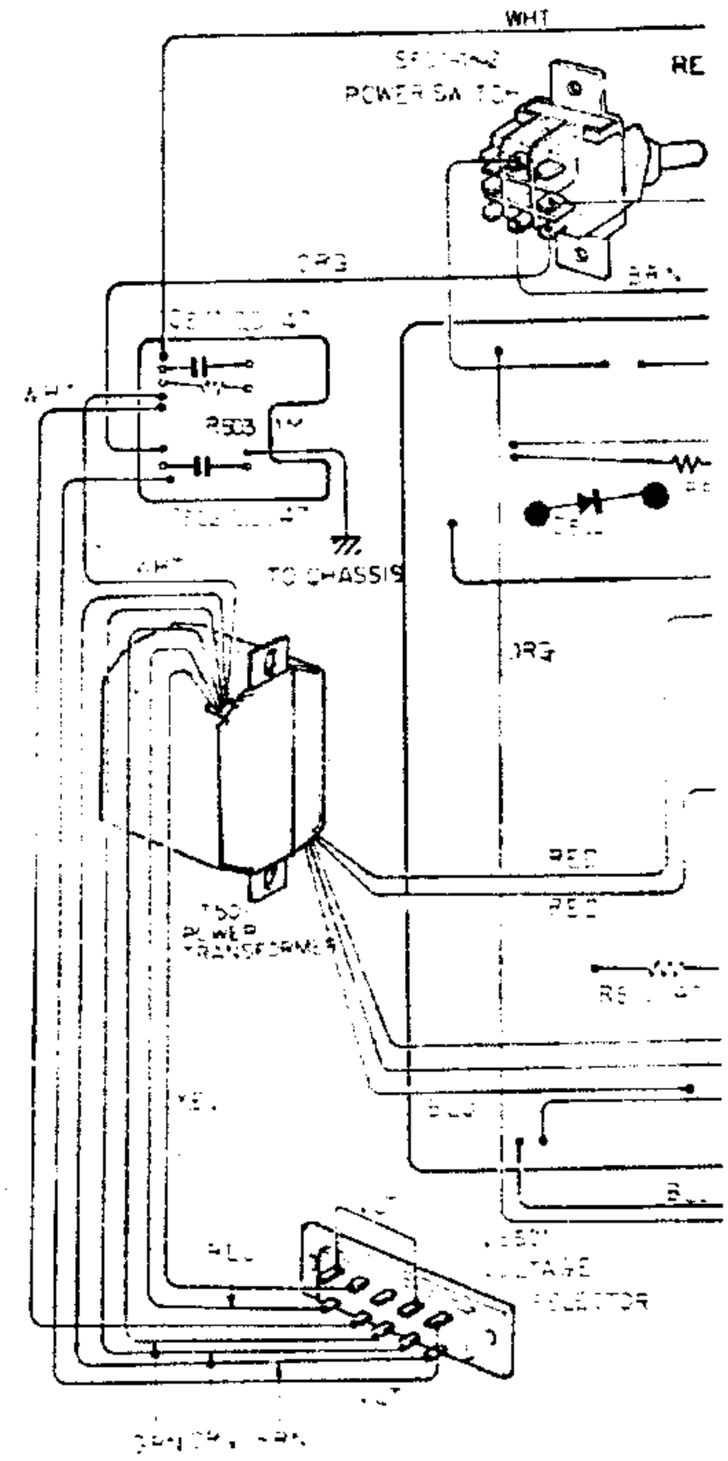
4-5. POWER SUPPLY CIRCUIT BOARD (P5)

THE QUALITY OF THIS PAGE IS THE BEST THAT IS AVAILABLE

– Conductor Side –

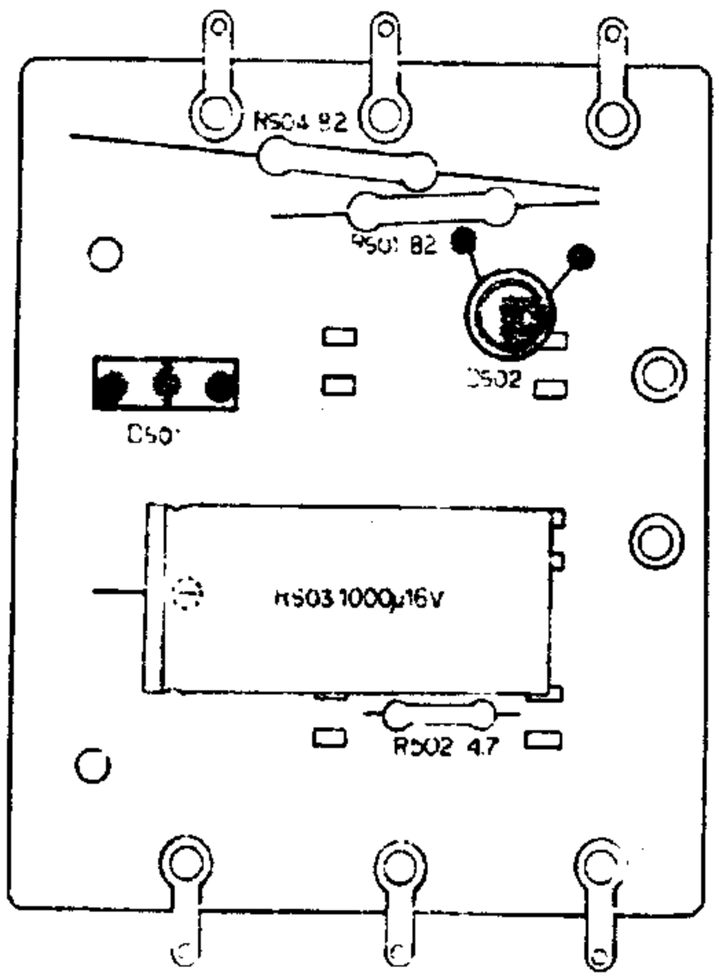


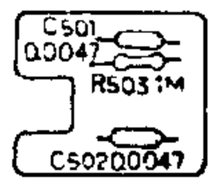
for USA and CANADA model



for General Export model

– Component Side –

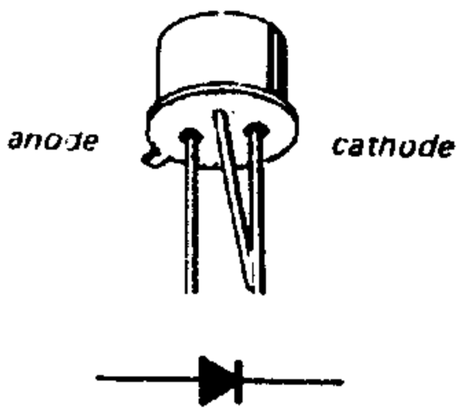




Printed circuit board
Part No. 1-581-103-11

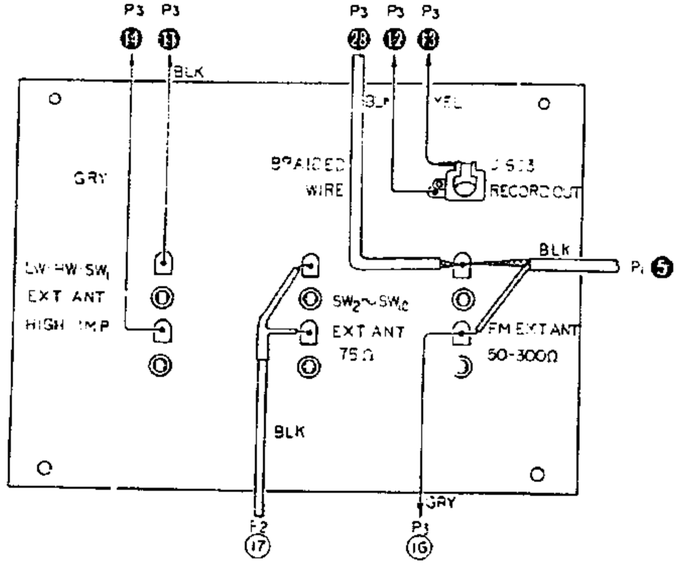
Printed circuit board
Part No. 1-581-104-11

D502; 1T378

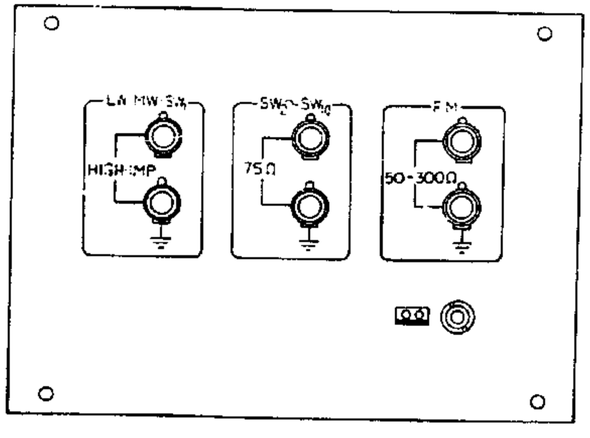


4-6. JACK PANEL (JP)

– Conductor Side –

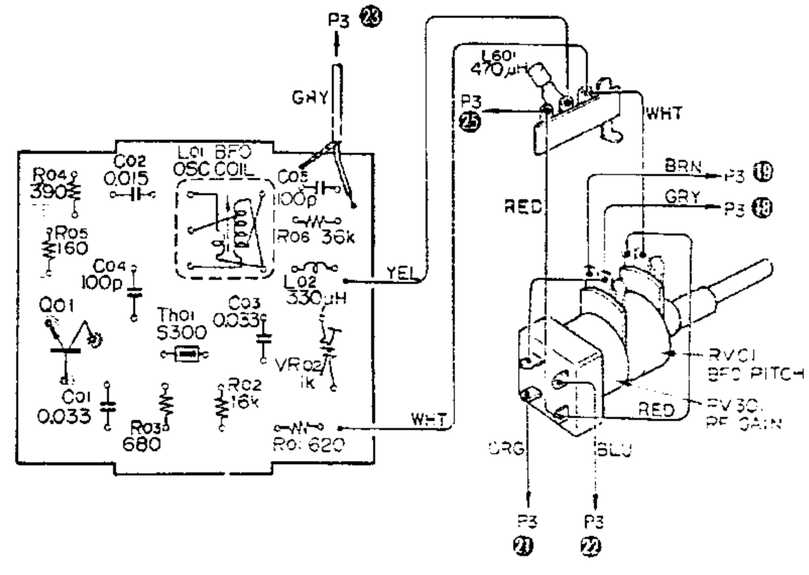


– Component Side –

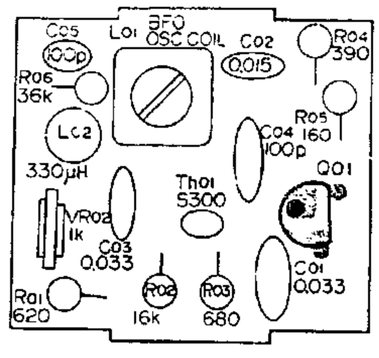


4-7. BFO BLOCK (P6)

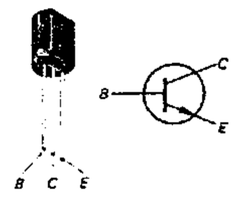
– Conductor Side –



– Component Side –



Q01: 2SC710



Printed circuit board
Part No. 1-539-629-11

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4-8. WIRING DIAGRAM

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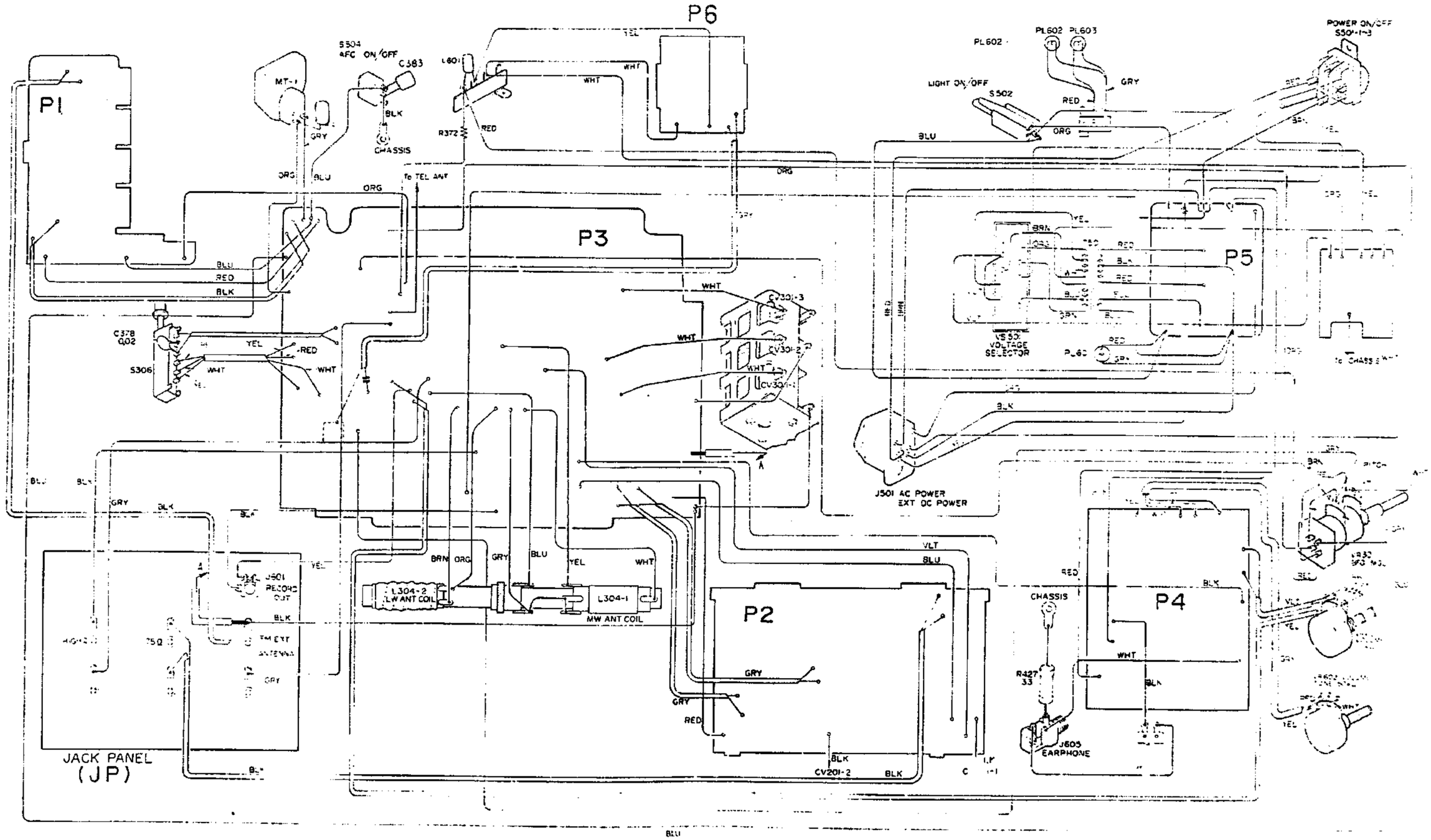

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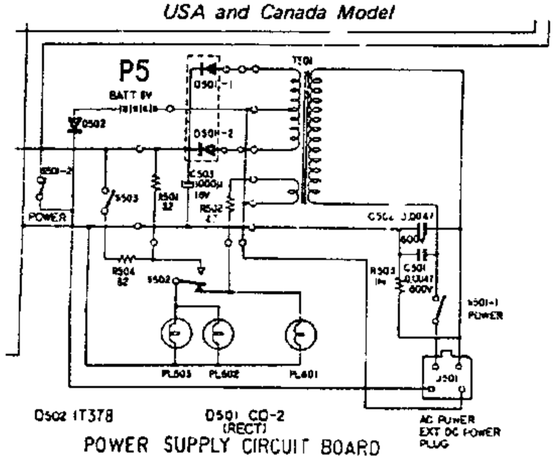
4-9. SCHEMATIC DIAGRAM

Note:

- All resistors and capacitors are in Ω and μF, unless otherwise indicated.
- Capacitors marked Δ are built in i-f transformers.
- The symbol x indicates a component whose value is selected to yield normal operating condition.
- Voltage values are measured from point indicated to ground circuit with a dc voltmeter (20 kΩ/V) and current values are measured with a dc ammeter.
  Voltage and current values are taken with no radio signal received.
- The values shown in ( ) are taken with fm band and in [ ] with ac power input.
- Variations may be noted due to normal production tolerances.
- In US and Canadian model, the voltage selector is omitted.

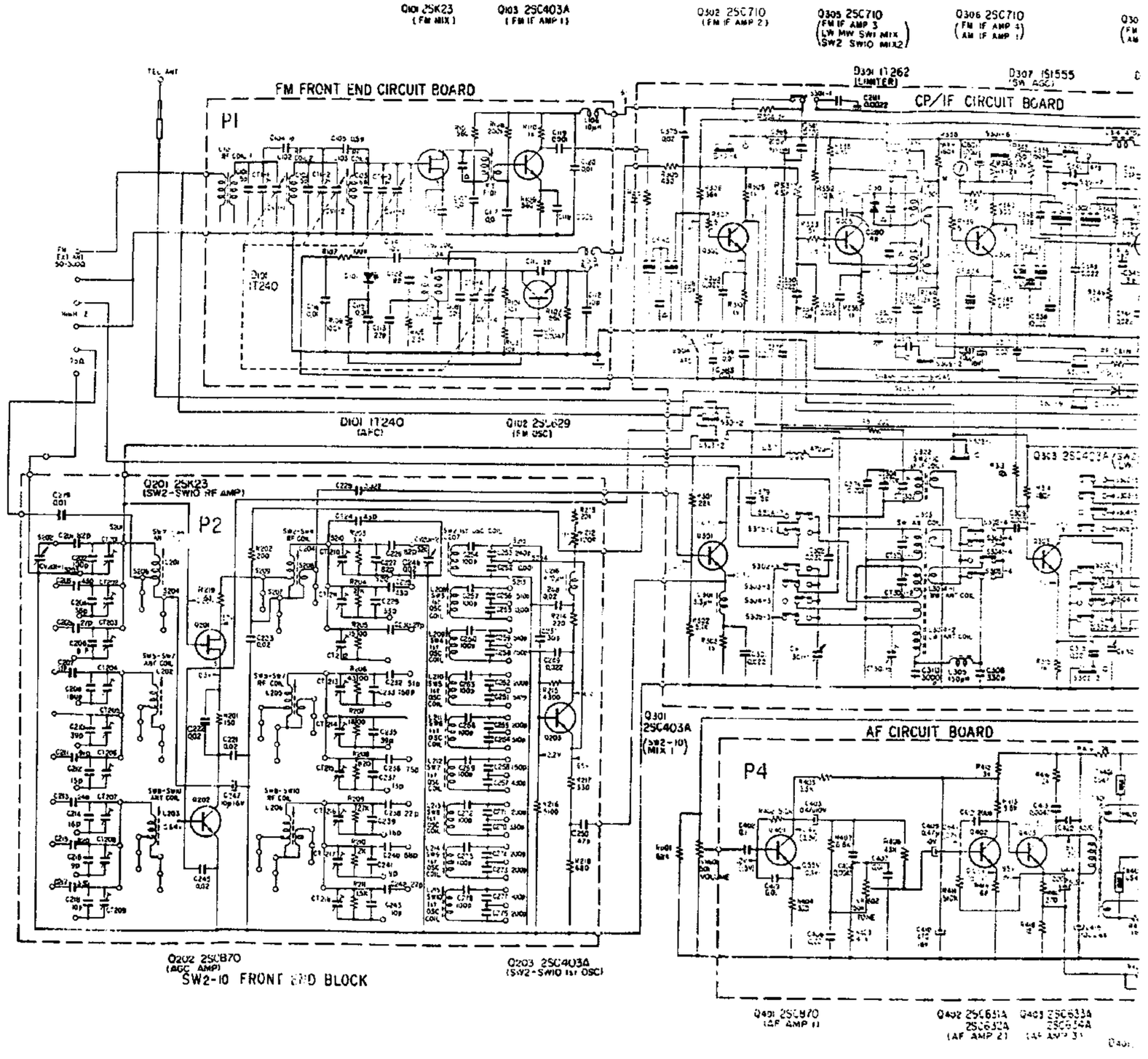
USA and Canada Model



POWER SUPPLY CIRCUIT BOARD

Switch Functions

Ref. No.	*Description*	*Mode*
S201-215	Band Selector, SW2-SW10	SW2
S301	Band Selector, FM	OFF
S302	Band Selector, SW2-SW10	OFF
S303	Band Selector, SW1	OFF
S304	Band Selector, MW	ON
S305	Band Selector, LW	OFF
S306	SELECTIVITY BROAD-SHARP	BROAD
S501	Power ON-OFF	ON
S502	Pilot Lamp	ON
S503	EXT DC Power	OFF
S504	AFC ON-OFF	ON



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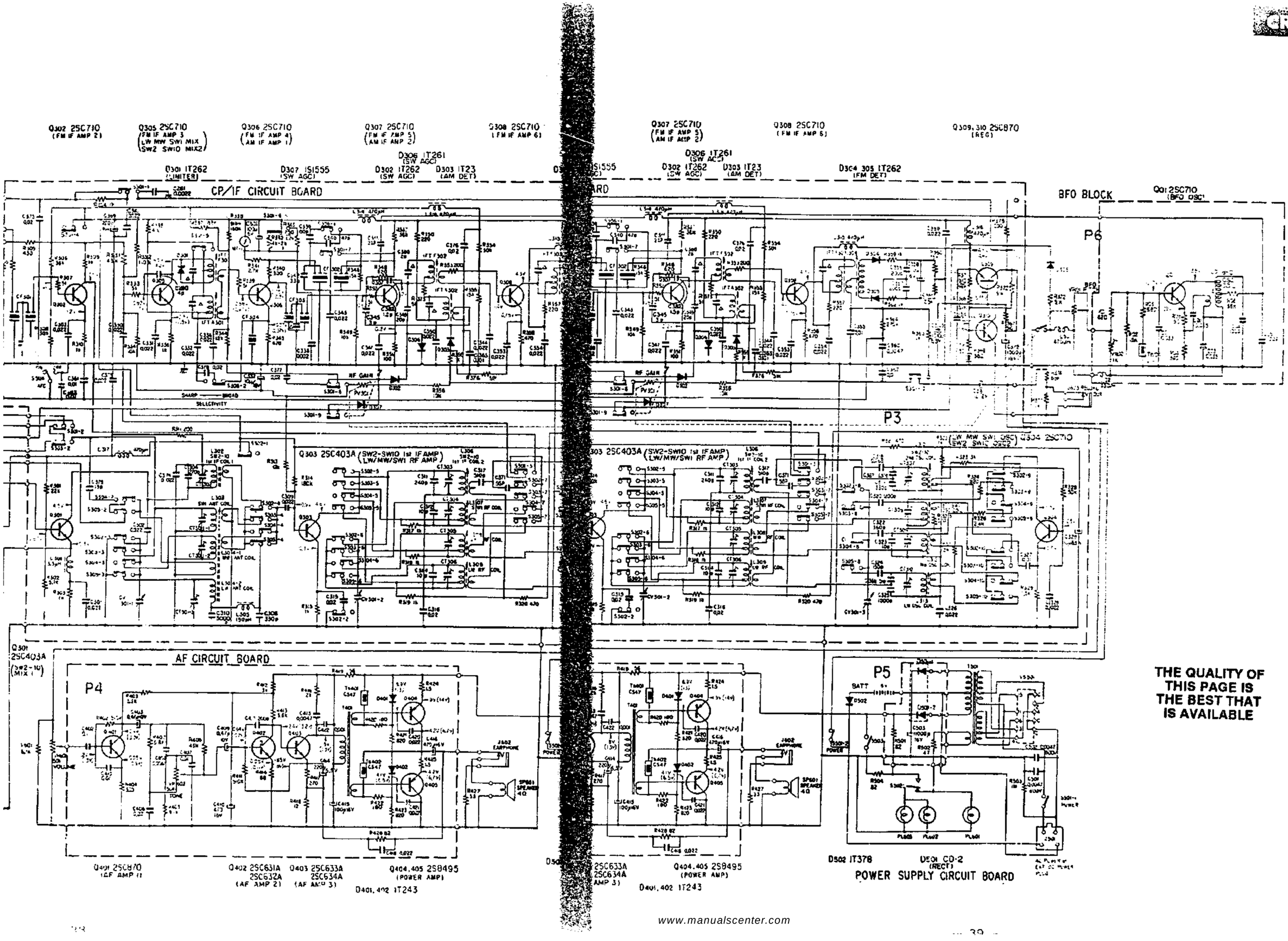
Q302 2SC710 (FM IF AMP 2)
Q305 2SC710 (FM IF AMP 3 LW MW SW1 MIX SW2 SW10 MIX2)
Q306 2SC710 (FM IF AMP 4 AM IF AMP 1)
Q307 2SC710 (FM IF AMP 5 AM IF AMP 2)
Q308 2SC710 (FM IF AMP 6)
Q307 2SC710 (FM IF AMP 5 AM IF AMP 2)
Q308 2SC710 (FM IF AMP 6)
Q309, 310 2SC870 (REG)
D306 IT261 (SW AGC)
D301 IT262 (LIMITER)
D307 1S1555 (SW AGC)
D302 IT262 (SW AGC)
D303 IT23 (AM DET)
D304 305 IT262 (FM DET)
CP/IF CIRCUIT BOARD
BFO BLOCK
Q01 2SC710 (BFO OSC)
P6
P3
Q303 2SC403A (SW2-SW10 1st IF AMP) (LW/MW/SW1 RF AMP)
(LW MW SW1 OSC) Q304 2SC710 (SW2 SW10 OSC)
Q501 2SC403A (SW2-10) (MIX 1)
AF CIRCUIT BOARD
P4
P5
Q401 2SC870 (1F AMP 1)
Q402 2SC631A 2SC632A (AF AMP 2)
Q403 2SC633A 2SC634A (AF AMP 3)
Q404, 405 2SB495 (POWER AMP)
D401, 402 1T243
D502 1T378
D501 CD-2 (RECT)
POWER SUPPLY CIRCUIT BOARD

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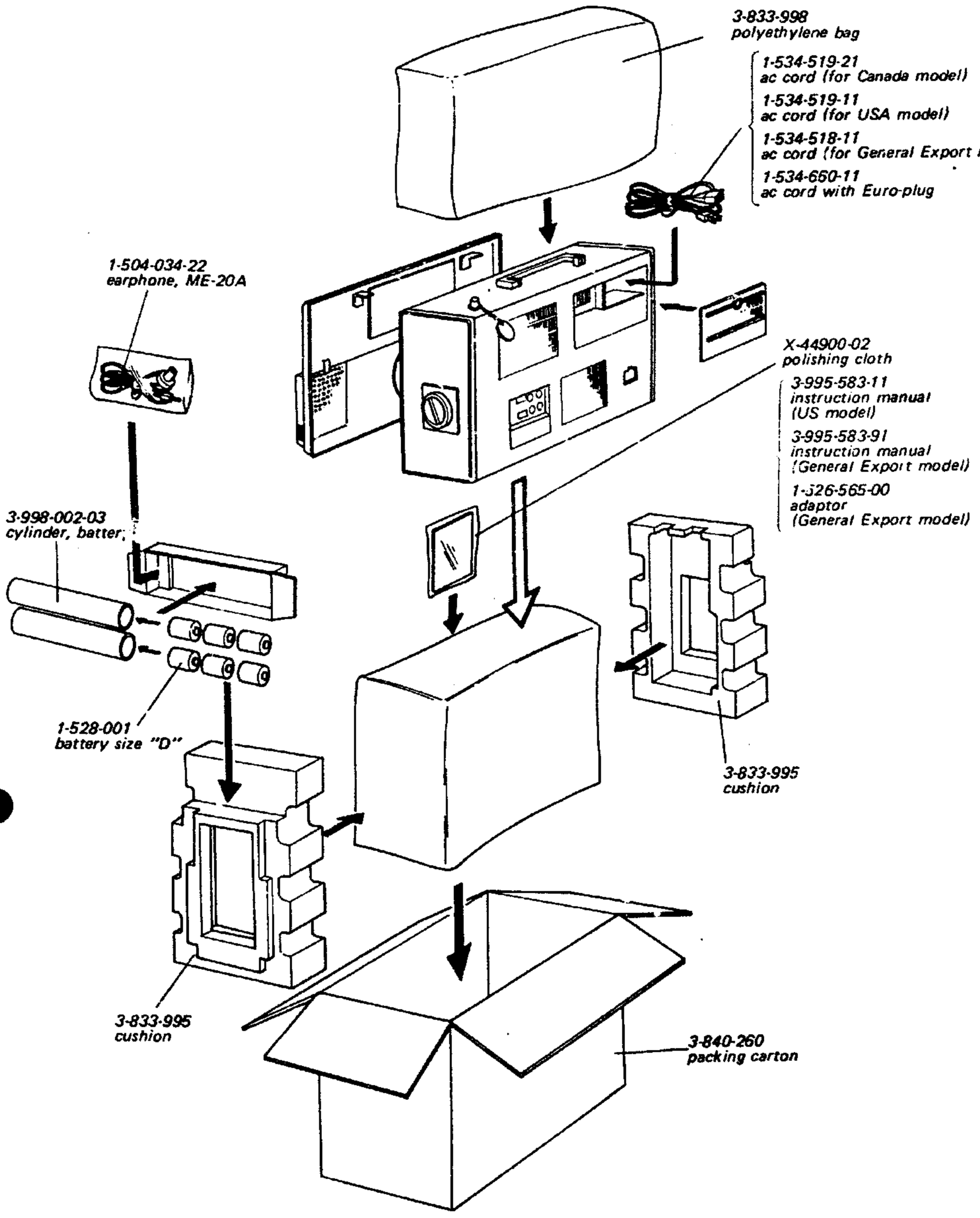
CRF-160

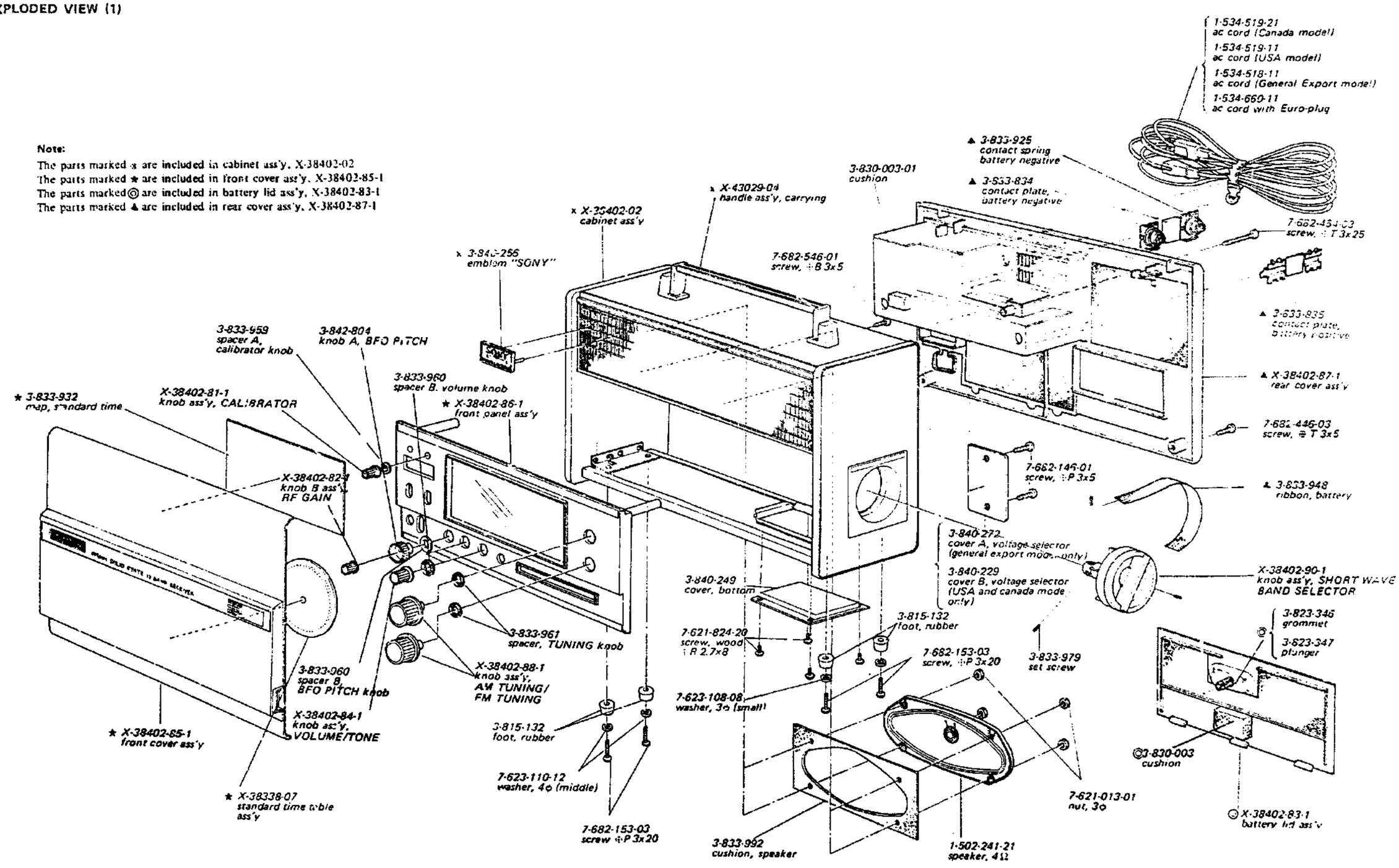
SECTION 5
PACKING AND EXPLODED VIEW

5-1. PACKING



5-2. EXPLODED VIEW (1)

Note:
The parts marked x are included in cabinet ass'y, X-38402-02
The parts marked ★ are included in front cover ass'y, X-38402-85-1
The parts marked ◎ are included in battery lid ass'y, X-38402-83-1
The parts marked ▲ are included in rear cover ass'y, X-38402-87-1


1-534-519-21 ac cord (Canada model)
1-534-519-11 ac cord (USA model)
1-534-518-11 ac cord (General Export model)
1-534-669-11 ac cord with Euro-plug
▲ 3-833-925 contact spring battery negative
▲ 3-833-834 contact plate, battery negative
3-830-003-01 cushion
x X-43029-04 handle ass'y, carrying
x X-38402-02 cabinet ass'y
7-682-453-03 screw, ⊕ T 3x25
x 3-840-256 emblem "SONY"
7-682-546-01 screw, ⊕ B 3x5
▲ 3-833-835 contact plate, battery positive
▲ X-38402-87-1 rear cover ass'y
7-682-446-03 screw, ⊕ T 3x5
3-833-959 spacer A, calibrator knob
3-842-804 knob A, BFO PITCH
3-833-960 spacer B, volume knob
★ X-38402-86-1 front panel ass'y
★ 3-833-932 map, standard time
X-38402-81-1 knob ass'y, CALIBRATOR
7-682-146-01 screw, ⊕ P 3x5
▲ 3-833-948 ribbon, battery
X-38402-82-1 knob B ass'y, RF GAIN
3-840-272 cover A, voltage selector (general export model only)
3-840-229 cover B, voltage selector (USA and canada mode only)
X-38402-90-1 knob ass'y, SHORT WAVE BAND SELECTOR
3-840-249 cover, bottom
3-815-132 foot, rubber
3-823-346 grommet
3-823-347 plunger
7-621-824-20 screw, wood (+B 2.7x8
7-682-153-03 screw, ⊕ P 3x20
3-833-979 set screw
3-833-961 spacer, TUNING knob
X-38402-88-1 knob ass'y, AM TUNING/ FM TUNING
3-833-960 spacer B, BFO PITCH knob
7-623-108-08 washer, 3φ (small)
◎ 3-830-003 cushion
X-38402-84-1 knob ass'y, VOLUME/TONE
3-815-132 foot, rubber
★ X-38402-85-1 front cover ass'y
7-623-110-12 washer, 4φ (middle)
7-621-013-01 nut, 3φ
★ X-38338-07 standard time table ass'y
7-682-153-03 screw ⊕ P 3x20
3-833-992 cushion, speaker
1-502-241-21 speaker, 4Ω
◎ X-38402-83-1 battery lid ass'y

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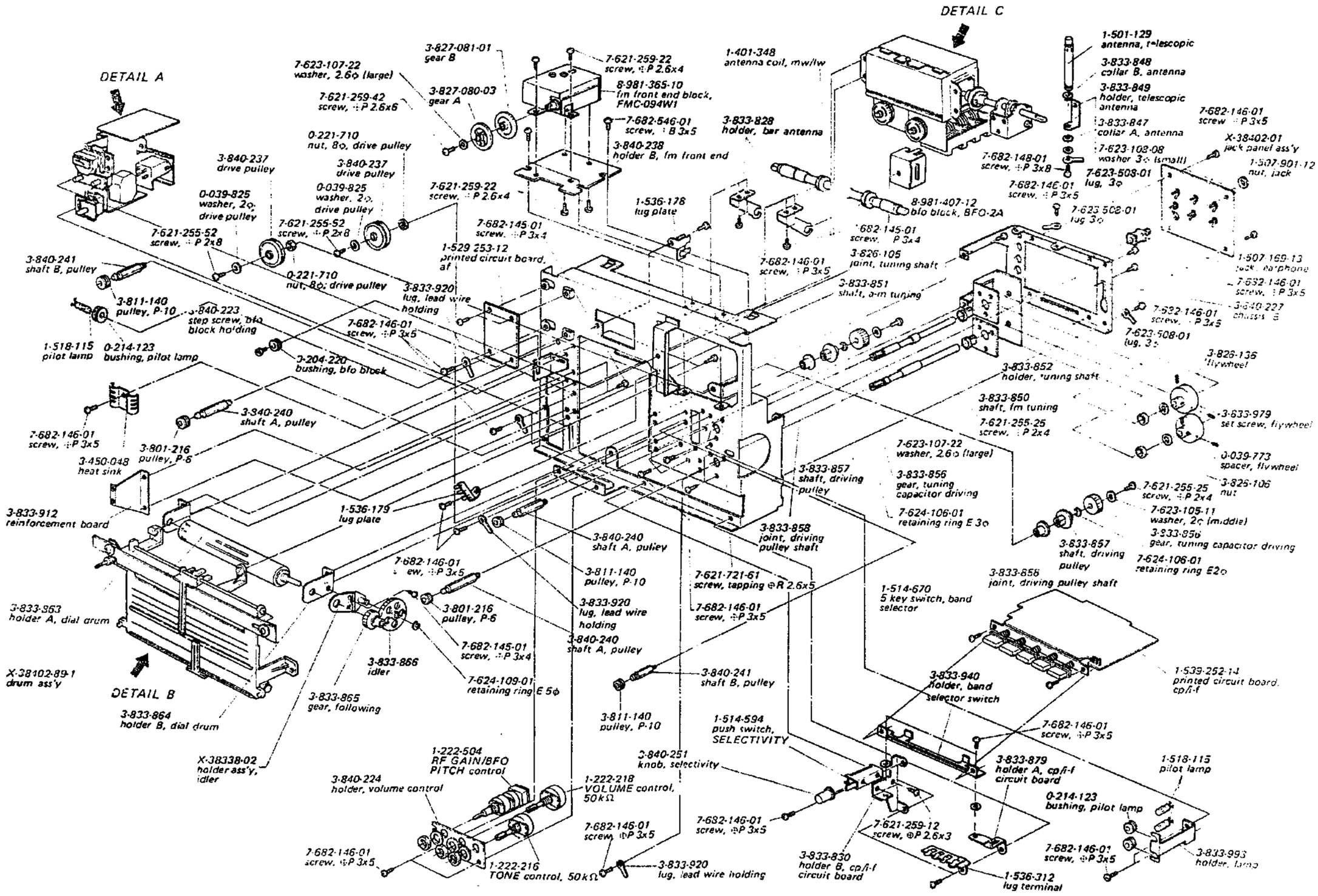
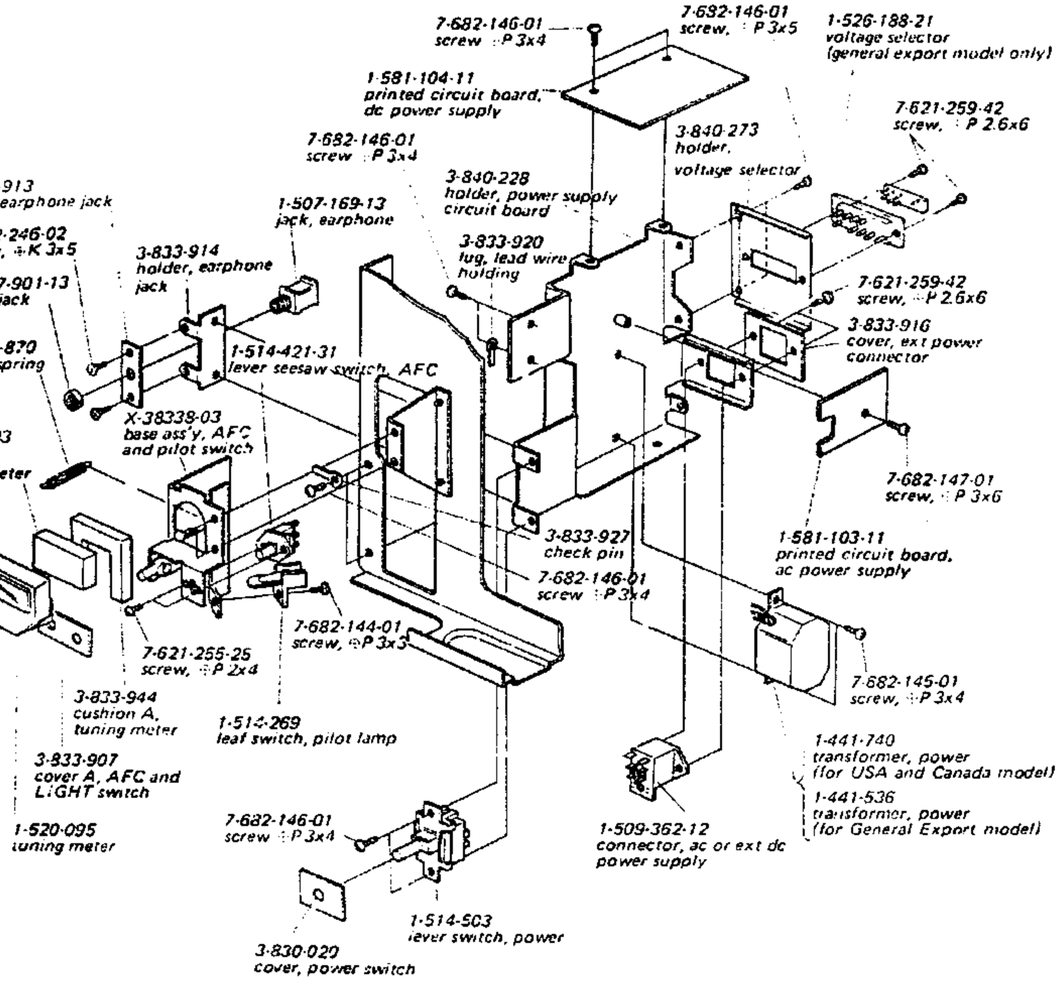
EXPLODED VIEW (2)

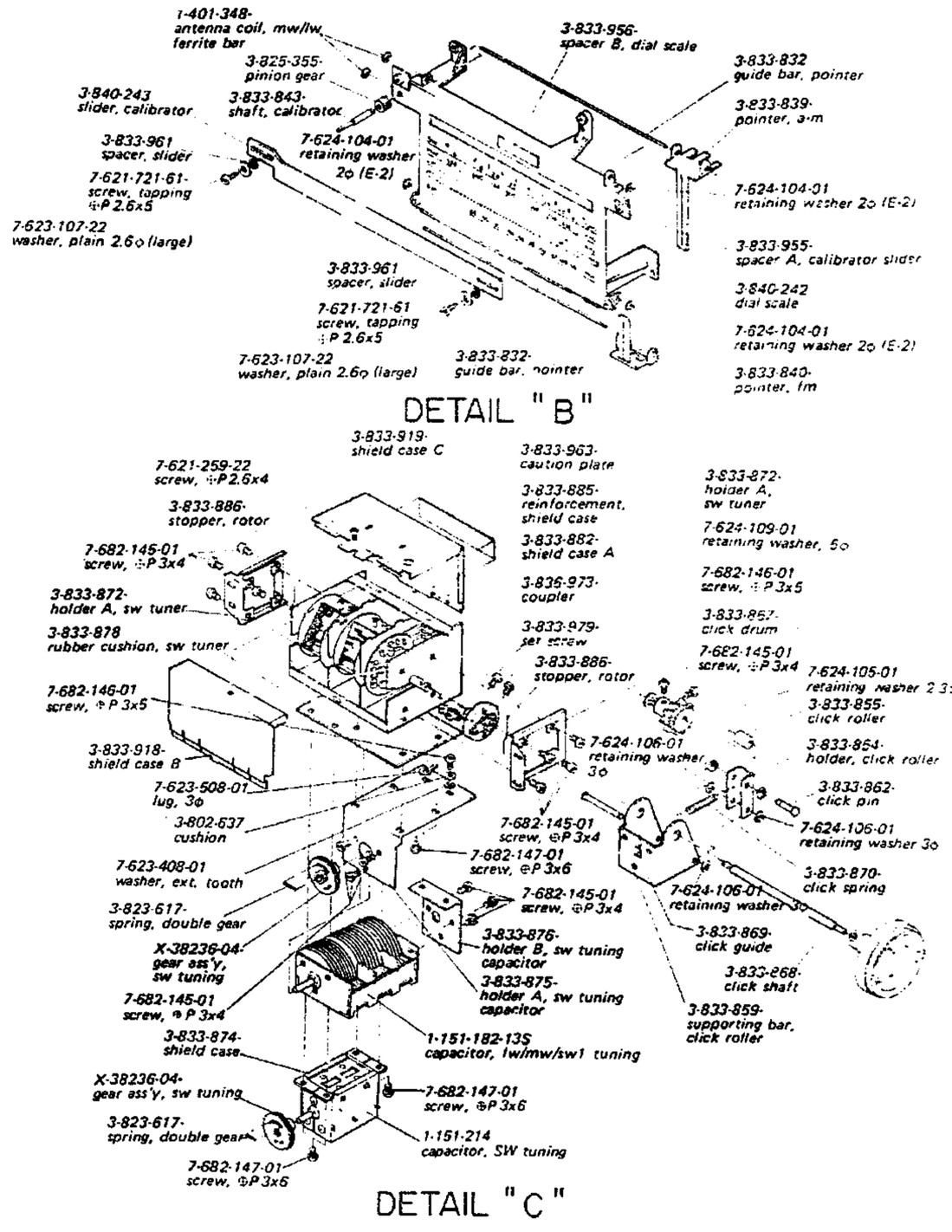


EXPLODED VIEW (3)


7-682-146-01 screw ⊕P 3x4
7-682-146-01 screw, ⊕P 3x5
1-526-188-21 voltage selector (general export model only)
1-581-104-11 printed circuit board, dc power supply
7-621-259-42 screw, ⊕P 2.6x6
3-840-273 holder, voltage selector
3-833-913 plate, earphone jack
7-682-246-02 screw, ⊕K 3x5
1-507-169-13 jack, earphone
3-840-228 holder, power supply circuit board
3-833-920 lug, lead wire holding
3-833-914 holder, earphone jack
1-507-901-13 nut, jack
7-621-259-42 screw, ⊕P 2.6x6
3-833-916 cover, ext power connector
3-833-870 click spring
1-514-421-31 lever seesaw switch, AFC
X-38339-03 base ass'y, AFC and pilot switch
3-830-003 cushion, tuning meter
7-682-147-01 screw, ⊕P 3x6
3-833-927 check pin
7-682-146-01 screw ⊕P 3x4
1-581-103-11 printed circuit board, ac power supply
7-682-144-01 screw, ⊕P 3x3
7-621-255-25 screw, ⊕P 2x4
7-682-145-01 screw, ⊕P 3x4
3-833-944 cushion A, tuning meter
1-514-269 leaf switch, pilot lamp
1-441-740 transformer, power (for USA and Canada model)
1-441-536 transformer, power (for General Export model)
3-833-907 cover A, AFC and LIGHT switch
1-520-095 tuning meter
7-682-146-01 screw ⊕P 3x4
1-509-362-12 connector, ac or ext dc power supply
1-514-503 lever switch, power
3-830-020 cover, power switch

DETAIL "A"

EXPLODED VIEW (4)



DETAIL "C"

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SECTION 6
ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description	
	SEMICONDUCTORS		
Q101		transistor (FET)	2SK23
Q102		transistor	2SC629
Q103		transistor	2SC403A
Q201		transistor (FET)	2SK23
Q202		transistor	2SC870
Q203		transistor	2SC403A
Q301		transistor	2SC403A
Q302		transistor	2SC710
Q303		transistor	2SC403A
Q304		transistor	2SC710
Q305		transistor	2SC710
Q306		transistor	2SC710
Q307		transistor	2SC710
Q308		transistor	2SC710
Q[redacted]		transistor	2SC870
Q310		transistor	2SC870
Q401		transistor	2SC870
Q402		transistor	2SC631A or 2SC632A
Q403		transistor	2SC633A or 2SC634A
Q404		transistor	2SB495
Q405		transistor	2SB495
Q01		transistor	2SC710
D101		diode	1T240
D301		diode	1T262
D302		diode	1T262
D303		diode	1T23
D304		diode	1T262
D305		diode	1T262
D306		diode	1T261
D307		diode	1S1555
D308		diode	1S1555
D4[redacted]		diode	1T243
D402		diode	1T243
D501		diode	CD-2
D502		diode	1T378
Th401	8-691-002-11	thermistor	CS-47
Th402	8-691-002-11	thermistor	CS-47
Th01	8-690-005-00	thermistor	S-300
	COILS AND TRANSFORMERS		
L101	1-425-526	rf coil 1, fm	
L102	1-425-525	rf coil 2, fm	
L103	1-425-525	rf coil 3, fm	
L104	1-405-386	osc coil, fm	
L105	1-407-186	4.7μH, micro inductor	
L106	1-407-190	10μH, micro inductor	
L201	1-401-405	antenna coil, SW2–SW4	
L202	1-401-406	antenna coil, SW5–SW7	
L203	1-401-407	antenna coil, SW8–SW10	
L204	1-425-579	rf coil, SW2–SW4	
L205	1-425-580	rf coil, SW5–SW7	
L206	1-425-581	rf coil, SW8–SW10	
L207	1-405-419	1st osc coil, SW2	
L208	1-405-420	1st osc coil, SW3	
L209	1-405-421	1st osc coil, SW4	
L210	1-405-422	1st osc coil, SW5	
L211	1-405-423	1st osc coil, SW6	
L212	1-405-424	1st osc coil, SW7	
L213	1-405-425	1st osc coil, SW8	
L214	1-405-426	1st osc coil, SW9	
L215	1-405-427	1st osc coil, SW10	
L216	1-407-177	470μH, micro inductor	
L301	1-407-184	3.3μH, micro inductor	
L302	1-425-442	1st i-f coil, SW2–SW10	
L303	1-401-408	antenna coil, SW1	
L304	1-401-348	antenna coil, MW/LW	
L305	1-407-171	15μH, micro inductor	
L306	1-425-442	1st i-f coil, SW2–SW10	
L307	1-425-577	rf coil, SW1	
L308	1-425-578	rf coil, MW	
L309	1-425-582	rf coil, LW	
L310	1-425-576	2nd osc coil, SW2–SW10	
L311	1-405-408	osc coil, SW1	
L312	1-405-409	osc coil, MW	
L313	1-405-410	osc coil, LW	
L314	1-407-177	470μH, micro inductor	
L315	1-407-177	470μH, micro inductor	
L316	1-407-177	470μH, micro inductor	
L317	1-407-177	470μH, micro inductor	
L318	1-407-177	470μH, micro inductor	
L01	1-405-450	osc coil, bfo	
L02	1-407-175	330μH, micro inductor	
IFTF101	1-403-294	transformer, fm i-f	
IFTF301	1-403-244-15	transformer, fm i-f	
IFTF302	1-403-244-15	transformer, fm i-f	
IFTF303	1-403-272-15	transformer, fm discriminator	
IFTF304	1-403-288-11	transformer, fm discriminator	
IFTA301	1-403-026-21	transformer, a-m i-f	
IFTA302	1-403-137-11	transformer, a-m i-f	
CF301	1-527-501-15	ceramic filter, fm 10.76 MHz	
CF302	1-403-161-13	ceramic filter, a-m	
CF303	1-527-501-15	ceramic filter, fm 10.76 MHz	
CF304	1-403-154-11	ceramic filter, a-m	
T401	1-423-140	transformer, driver	
T501	1-441-740	transformer, power (for US and Canada Model)	
	1-441-536	transformer, power (for General Export Model)	
	CAPACITORS		
C101	1-101-861	15pF	ceramic
C102	1-101-861	15pF	ceramic
C103	1-101-956	6pF	ceramic
C104	1-101-937	1pF	ceramic

Ref. No.	Part No.	Description	
C105	1-101-936	0.5pF	ceramic
C106		– discarded –	
C107	1-101-864	0.01μF	ceramic
C108	1-102-508	10pF	ceramic
C109	1-102-089	0.0022μF	ceramic
C110	1-102-864	5pF	ceramic
C111	1-102-090	0.0047μF	ceramic
C112	1-102-508	10pF	ceramic
C113	1-101-869	27pF	ceramic
C114	1-101-976	10pF	ceramic
C115	1-101-072	0.01μF	ceramic
C116	1-101-072	0.01μF	ceramic
C117	1-101-072	0.01μF	ceramic
C118	1-105-829-12	0.005μF	mylar
C119	1-101-918	0.001μF	ceramic
C120	1-101-072	0.01μF	ceramic
C121	1-101-958	8pF	ceramic
C122	1-101-958	8pF	ceramic
C201	1-107-083	82pF	silvered mica
C202	1-107-085	100pF	silvered mica
C203	1-107-076	43pF	silvered mica
C204	1-107-074	36pF	silvered mica
C205	1-107-071	27pF	silvered mica
C206	1-107-105	8pF	silvered mica
C207	1-107-078	51pF	silvered mica
C208	1-107-086	120pF	silvered mica
C209	1-107-077	47pF	silvered mica
C210	1-107-075	39pF	silvered mica
C211	1-107-084	91pF	silvered mica
C212	1-107-064	13pF	silvered mica
C213	1-107-070	24pF	silvered mica
C214	1-107-066	16pF	silvered mica
C215	1-107-083	82pF	silvered mica
C216	1-107-106	9pF	silvered mica
C217	1-107-073	33pF	silvered mica
C218	1-107-061	10pF	silvered mica
C219		– discarded –	
C220		– discarded –	
C221	1-101-924	0.02μF	ceramic
C222	1-101-924	0.02μF	ceramic
C223	1-101-924	0.02μF	ceramic
C224	1-107-076	43pF	silvered mica
C225	1-105-837-12	0.022μF	mylar
C226	1-107-083	82pF	silvered mica
C227	1-107-083	82pF	silvered mica
C228	1-107-076	43pF	silvered mica
C229	1-107-073	33pF	silvered mica
C230	1-107-071	27pF	silvered mica
C231		– discarded –	
C232	1-107-078	51pF	silvered mica
C233	1-107-086	120pF	silvered mica
C234	1-107-068	20pF	silvered mica
C235	1-107-075	39pF	silvered mica
C236	1-107-082	75pF	silvered mica

Ref. No.	Part No.	Description	
C237	1-107-064	13pF	silvered mica
C238	1-107-069	22pF	silvered mica
C239	1-107-066	16pF	silvered mica
C240	1-107-081	68pF	silvered mica
C241	1-107-106	9pF	silvered mica
C242	1-107-071	27pF	silvered mica
C243		– discarded –	
C244		– discarded –	
C245	1-101-924	0.02μF	ceramic
C246	1-101-924	0.02μF	ceramic
C247	1-121-398	10μF 16V	electrolytic
C248	1-101-924	0.02μF	ceramic
C249	1-105-837-12	0.022μF	mylar
C250	1-107-077	47pF	silvered mica
C251	1-107-072	30pF	silvered mica
C252	1-105-661-12	0.001μF	mylar
C253	1-103-610	240pF	styrol
C254	1-102-734	100pF	ceramic
C255	1-105-661-12	0.001μF	mylar
C256	1-103-618	510pF	styrol
C257	1-102-702	100pF	ceramic
C258	1-103-622	750pF	styrol
C259	1-103-618	510pF	styrol
C260	1-102-702	100pF	ceramic
C261	1-103-618	510pF	styrol
C262	1-103-608	200pF	styrol
C263	1-102-702	100pF	ceramic
C264	1-103-618	510pF	styrol
C265	1-103-608	200pF	styrol
C266	1-102-702	100pF	ceramic
C267	1-103-616	430pF	styrol
C268	1-103-605	150pF	styrol
C269	1-102-734	100pF	ceramic
C270	1-103-613	330pF	styrol
C271	1-103-608	200pF	styrol
C272	1-102-702	100pF	ceramic
C273	1-103-608	200pF	styrol
C274	1-103-608	200pF	styrol
C275	1-102-734	100pF	ceramic
C276	1-103-608	200pF	styrol
C277	1-103-601	100pF	styrol
C278	1-102-734	100pF	ceramic
C279	1-101-923	0.01μF	ceramic
C280	1-102-937	4pF	ceramic
C281	1-105-665-12	0.0022μF	mylar
C301	1-105-677-12	0.022μF	mylar
C302	1-105-677-12	0.022μF	mylar
C303	1-105-677-12	0.022μF	mylar
C304	1-103-611	270pF	styrol
C305		– discarded –	
C306		– discarded –	
C307		– discarded –	
C308	1-103-613	330pF	styrol
C309	1-105-677-12	0.022μF	mylar

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Ref. No.	Part No.	Description	
C310	1-103-636	3,000pF	styrol
C311	1-103-610	240pF	styrol
C312	1-101-959	10pF	ceramic
C313		– discarded –	
C314	1-101-959	10pF	ceramic
C315	1-101-924	0.02μF	ceramic
C316	1-105-677-12	0.022μF	mylar
C317	1-103-618	510pF	styrol
C318	1-105-683-12	0.068μF	mylar
C319	1-103-613	330pF	styrol
C320	1-103-627	1,200pF	styrol
C321		– discarded –	
C322	1-103-614	360pF	styrol
C323	1-101-959	10pF	ceramic
C324	1-103-605	150pF	styrol
C325	1-103-625	1,000pF	styrol
C326	1-105-677-12	0.022μF	mylar
C327	1-105-673-12	0.01μF	mylar
C328	1-105-677-12	0.022μF	mylar
C329	1-121-468	10μF 6.3V	electrolytic
C330	1-105-677-12	0.022μF	mylar
C331	1-105-677-12	0.022μF	mylar
C332	1-105-677-12	0.022μF	mylar
C333		– discarded –	
C334		– discarded –	
C335	1-101-867	24pF	ceramic
C336	1-105-677-12	0.022μF	mylar
C337	1-121-347	10μF 16V	electrolytic
C338	1-105-677-12	0.022μF	mylar
C339	1-103-605	150pF	styrol
C340	1-101-880	47pF	ceramic
C341	1-105-677-12	0.022μF	mylar
C342	1-101-872	33pF	ceramic
C343	1-105-677-12	0.022μF	mylar
C344	1-105-677-12	0.022μF	mylar
C345	1-101-187	3pF	ceramic
C346		– discarded –	
C347	1-105-677-12	0.022μF	mylar
C348	1-101-864	20pF	ceramic
C349		– discarded –	
C350	1-105-677-12	0.022μF	mylar
C351		– discarded –	
C352		– discarded –	
C353	1-105-677-12	0.022μF	mylar
C354	1-105-677-12	0.022μF	mylar
C355	1-105-673-12	0.01μF	mylar
C356	1-103-608	200pF	styrol
C357	1-103-608	200pF	styrol
C358	1-121-468	10μF 6.3V	electrolytic
C359	1-105-677-12	0.022μF	mylar
C360	1-105-681-12	0.0047μF	mylar
C361	1-105-673-12	0.01μF	mylar
C362	1-105-673-12	0.01μF	mylar
C363	1-105-673-12	0.01μF	mylar

Ref. No.	Part No.	Description	
C364	1-105-677-12	0.022μF	mylar
C365	1-121-413	100μF 6.3V	electrolytic
C366		– discarded –	
C367	1-103-613	330pF	styrol
C368	1-101-862	51pF	ceramic
C369	1-121-413	100μF 6.3V	electrolytic
C370		– discarded –	
C371	1-101-884	56pF	ceramic
C372	1-121-186	1,000μF 16V	electrolytic
C373	1-105-677-12	0.022μF	mylar
C374	1-105-677-12	0.022μF	mylar
C375	1-101-924	0.02μF	ceramic
C376	1-101-924	0.02μF	ceramic
C377	1-101-924	0.02μF	ceramic
C378	1-101-924	0.02μF	ceramic
C379	1-101-861	15pF	ceramic
C380		– discarded –	
C381	1-121-438	1μF 12V	electrolytic
C382	1-101-576	1.5pF	ceramic
C383	1-105-673-12	0.01μF	mylar
C401		– discarded –	
C402	1-105-685-12	0.1μF	mylar
C403	1-121-726	0.47μF 10V	electrolytic
C404	1-105-669-12	0.0047μF	mylar
C405		– discarded –	
C406	1-105-689-12	0.22μF	mylar
C407	1-105-673-12	0.01μF	mylar
C408		– discarded –	
C409	1-121-726	0.47μF 10V	electrolytic
C410	1-121-426	470μF 16V	electrolytic
C411		– discarded –	
C412	1-107-138	200pF	silvered mica
C413	1-105-669-12	0.0047μF	mylar
C414	1-121-420	220μF 6.3V	electrolytic
C415	1-121-415	100μF 16V	electrolytic
C416	1-121-426	470μF 16V	electrolytic
C417		– discarded –	
C418	1-105-677-12	0.022μF	mylar
C419	1-105-673-12	0.01μF	mylar
C420	1-105-677-12	0.022μF	mylar
C421	1-105-677-12	0.022μF	mylar
C422	1-105-661-12	0.001μF	mylar
C501	1-115-071	0.0047μF 600V	paper
C502	1-115-071	0.0047μF 600V	paper
C503	1-121-186	1,000μF 16V	electrolytic
C601	1-121-413	100μF 6.3V	electrolytic
C01	1-105-839-12	0.033μF	mylar
C02	1-105-673-12	0.015μF	mylar
C03	1-105-839-12	0.033μF	mylar
C04	1-102-764	100pF	ceramic
C05	1-103-651	100pF	styrol
CV1-1~ CV1-4	1-151-158-12	capacitor, fm tuning, 4 gang	

Ref. No.	Part No.	Description
CV201-1 CV201-2	1-151-214	capacitor, sw tuning, 2 gang
CV301-1 CV301-2 CV301-3	1-151-182-13S	capacitor, lw/mw/sw1 tuning, 3 gang
CT1-1~ CT1-4	1-141-086	capacitor, fm trimmer, 4 gang
CT201	1-141-078	capacitor, sw trimmer (16pF)
CT202	1-141-078	capacitor, sw trimmer (16pF)
CT203	1-141-078	capacitor, sw trimmer (16pF)
CT204	1-141-078	capacitor, sw trimmer (16pF)
CT205	1-141-078	capacitor, sw trimmer (16pF)
CT206	1-141-078	capacitor, sw trimmer (16pF)
CT207	1-141-078	capacitor, sw trimmer (16pF)
CT208	1-141-078	capacitor, sw trimmer (16pF)
CT209	1-141-078	capacitor, sw trimmer (16pF)
CT210	1-141-078	capacitor, sw trimmer (16pF)
CT211	1-141-078	capacitor, sw trimmer (16pF)
CT212	1-141-078	capacitor, sw trimmer (16pF)
CT213	1-141-078	capacitor, sw trimmer (16pF)
CT214	1-141-078	capacitor, sw trimmer (16pF)
CT215	1-141-078	capacitor, sw trimmer (16pF)
CT216	1-141-078	capacitor, sw trimmer (16pF)
CT217	1-141-078	capacitor, sw trimmer (16pF)
CT218	1-141-078	capacitor, sw trimmer (16pF)
CT301-1 CT301-2 CT301-3	1-141-015-12	capacitor, a-m trimmer, 3 gang
CT302	1-141-135	capacitor, trimmer (30pF)
CT303	1-141-135	capacitor, trimmer (30pF)
CT304	1-141-135	capacitor, trimmer (30pF)
CT305	1-141-135	capacitor, trimmer (30pF)
CT306	1-141-135	capacitor, trimmer (30pF)
CT307	1-141-135	capacitor, trimmer (30pF)
CT308	1-141-135	capacitor, trimmer (30pF)
CT309	1-141-135	capacitor, trimmer (30pF)
CT310	1-141-135	capacitor, trimmer (30pF)

RESISTORS

All resistors are ¼W ±5% carbon type resistors unless otherwise specified.

Ref. No.	Part No.			Description
R101	1-208-027	560Ω	1/16W	ceramic
R102	1-208-027	560Ω	1/16W	ceramic
R103	1-244-697	10kΩ		
R104	1-244-697	10kΩ		
R105	1-208-045	3.3kΩ	1/16W	ceramic
R106	1-208-145	100kΩ	1/16W	ceramic
R107	1-208-145	100kΩ	1/16W	ceramic
R108	1-208-088	200kΩ	1/16W	ceramic
R109	1-208-027	560Ω	1/16W	ceramic
R110	1-208-033	1kΩ	1/16W	ceramic
R201	1-244-653	150Ω		
R202	1-244-656	200Ω		
R203	1-210-372	3kΩ	1/16W	micro
R204	1-209-767	2kΩ	1/16W	micro
R205	1-209-766	1.5kΩ	1/16W	micro
R206	1-209-772	4.3kΩ	1/16W	micro
R207	1-209-878	1.8kΩ	1/16W	micro
R208	1-210-108	820Ω	1/16W	micro
R209	1-209-770	2.7kΩ	1/16W	micro
R210	1-209-767	2kΩ	1/16W	micro
R211	1-209-766	1.5kΩ	1/16W	micro
R212	1-221-638-12	100kΩ		adjustable
R213	1-244-704	20kΩ		
R214	1-244-657	220Ω		
R215	1-244-688	4.3kΩ		
R216	1-244-690	5.1kΩ		
R217	1-244-661	330Ω		
R218	1-244-669	680Ω		
R219	1-244-642	51Ω		
R301	1-240-505	22kΩ		
R302	1-240-490	5.1kΩ		
R303	1-240-473	1kΩ		
R304	1-240-473	1kΩ		
R305	1-240-464	430Ω		
R306	1-240-510	36 kΩ		
R307	1-240-442	51Ω		
R308	1-240-508	30kΩ		
R309	1-240-473	1kΩ		
R310	1-240-473	1kΩ		
R311	1-240-456	200Ω		
R312		– discarded –		
R313	1-240-499	12kΩ		
R314	1-240-527	180kΩ		
R315	1-240-473	1kΩ		
R316	1-240-449	100Ω		
R317	1-240-473	1kΩ		
R318	1-240-473	1kΩ		
R319	1-240-473	1kΩ		
R320	1-240-465	470Ω		
R321	1-240-465	470Ω		
R322	1-240-473	1kΩ		
R323	1-240-484	3kΩ		
R324	1-240-471	820Ω		
R325	1-240-466	510Ω		
R326	1-240-482	2.4kΩ		
R327	1-240-480	2kΩ		
R328	1-240-525	150kΩ		
R329	1-240-477	1.5kΩ		
R330		– discarded –		
R331	1-240-512	43kΩ		
R332	1-240-522	110kΩ		
R333	1-240-442	51Ω		
R334	1-240-497	10kΩ		
R335	1-240-465	470Ω		

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Ref. No.	*Part No*	*Description*
R336	1-240-473	1 kΩ
R337	1-240-519	82 kΩ
* R338	1-240-520	91 kΩ
	1-240-521	100 kΩ
	1-240-522	110 kΩ
	1-240-523	120 kΩ
	1-240-524	130 kΩ
	1-240-525	150 kΩ
R339	1-240-442	51 Ω
R340	1-240-460	300 Ω
R341	1-240-483	2.7 kΩ
* R342	1-240-473	1 kΩ
	1-240-475	1.2 kΩ
	1-240-477	1.5 kΩ
	1-240-479	1.8 kΩ
	1-240-480	2.0 kΩ
* R343	1-240-470	750 Ω
	1-240-471	820 Ω
	1-240-472	910 Ω
	1-240-473	1 kΩ
	1-240-475	1.2 kΩ
R344	1-240-499	12 kΩ
R345	1-240-465	470 Ω
R346	1-240-501	15 kΩ
R347	1-240-510	36 kΩ
R348	1-240-468	620 Ω
R349	1-240-497	10 kΩ
R350	1-240-457	220 Ω
R351	1-240-449	100 Ω
R352	1-240-442	51 Ω
R353	1-240-456	200 Ω
R354	1-240-508	30 kΩ
R355	1-240-501	15 kΩ
R356	1-240-497	10 kΩ
R357	1-240-457	220 Ω
R358	1-240-465	470 Ω
R359	1-240-473	1 kΩ
R360	1-240-494	7.5 kΩ
R361	1-240-494	7.5 kΩ
R362	1-240-473	1 kΩ
R363	1-240-473	1 kΩ
R364	1-240-531	270 kΩ
R365		– discarded –
R366	1-240-473	1 kΩ
R367	1-240-466	510 Ω
R368	1-240-487	3.9 kΩ
R369	1-240-467	560 Ω
R370	1-240-448	91 kΩ
* R371	1-240-466	510 Ω
	1-240-467	560 Ω
	1-240-468	620 Ω
	1-240-469	680 Ω
	1-240-470	750 Ω

Ref. No.	*Part No.*	*Description*
R372	1-240-490	5.1 kΩ
R373	1-240-442	51 Ω
R374	1-240-517	68 kΩ
R375	1-240-442	51 Ω
R376	1-240-490	5.1 kΩ
R377	1-240-473	1 kΩ
R401		– discarded –
R402	1-240-538	510 kΩ
R403	1-240-485	3.3 kΩ
R404	1-240-461	330 Ω
R405		– discarded –
R406	1-240-512	43 kΩ
R407	1-240-483	6.8 kΩ
R408	1-240-496	9.1 kΩ
R409		– discarded –
R410		– discarded –
R411	1-240-538	510 kΩ
R412	1-240-484	3 kΩ
R413	1-240-486	3.6 kΩ
R414	1-240-445	68 Ω
R415		– discarded –
R416	1-242-680	2 kΩ
R417	1-240-459	270 Ω
R418	1-240-427	12 Ω
R419	1-240-443	56 Ω
R420	1-240-455	180 Ω
R421	1-240-471	820 Ω
R422	1-240-455	180 Ω
R423	1-240-471	820 Ω
R424	1-210-154	1.5 Ω 1W carbon
R425	1-210-154	1.5 Ω 1W carbc.
R426		– discarded –
R427	1-209-154	33 Ω 1W carbon
R428	1-240-447	82 Ω
R501	1-244-847	82 Ω ½W carbon
R502	1-240-417	4.7 Ω
R503	1-202-645	1 MΩ ½W composition
R504	1-244-847	82 Ω ½W carbon
RV01 RV301	1-222-504	RF GAIN/BFO PITCH control, 20 kΩ and 10 kΩ
RV02	1-221-634	1 kΩ variable
RV601	1-222-218	VOLUME control, 50 kΩ
RV602	1-222-216	TONE control, 50 kΩ
R01	1-244-668	620 Ω
R02	1-244-678	1.6 kΩ
R03	1-244-669	680 Ω
R04	1-244-663	390 Ω
R05	1-244-654	160 Ω
R06	1-244-710	36 kΩ
R601	1-240-492-11	6.2 kΩ

MISCELLANEOUS

8-981-365-10 fm front end block, FMC-094W1

* to be selected.

Ref. No.	Part No.	Description
	8-981-367-61	sw front end block, SWC-021D2
	8-981-407-12	bfo block, BFO-2A
	1-539-252-14	printed circuit board, cp/i-f
	1-539-253-12	printed circuit board, af
	1-581-103-11	printed circuit board, ac power supply
	1-581-104-11	printed circuit board, dc power supply
TEL ANT	1-501-129	antenna, telescopic
S201 ~ S205		SW 2-SW10 band selector, assembled in sw front end
S301 ~ S305	1-514-670	5 key switch, band selector
S306	1-514-594	push switch, SELECTIVITY
S501	1-514-503	lever switch, POWER
S502	1-514-269	leaf switch, LIGHT
S503		ac dc selector, assembled in power supply connector
S504	1-514-421-31	lever seesaw switch, AFC

Ref. No.	Part No.	Description
J501	1-509-362	connector, ac or ext. dc power supply
J601	1-507-169-13	jack, record out
602	1-507-169-13	jack, earphone
	1-507-901-12	nut, earphone jack
SP601	1-502-241-21	speaker, 4 Ω
PL601	1-518-115-11	pilot lamp
PL602	1-518-115-11	pilot lamp
PL603	1-518-115-11	pilot lamp
MT-1	1-520-095-12	tuning meter
VS501	1-526-188-21	voltage selector (General Export Model only)
	1-536-178	plate, lug
	1-536-312	lug terminal
	1-536-179	plate, lug
	1-534-519-11	ac cord with plug (USA model)
	1-534-518-11	ac cord with plug (General Export model)
	1-534-660-11	ac cord with Euro-plug
	1-534-519-21	ac cord with plug (Canada model)

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